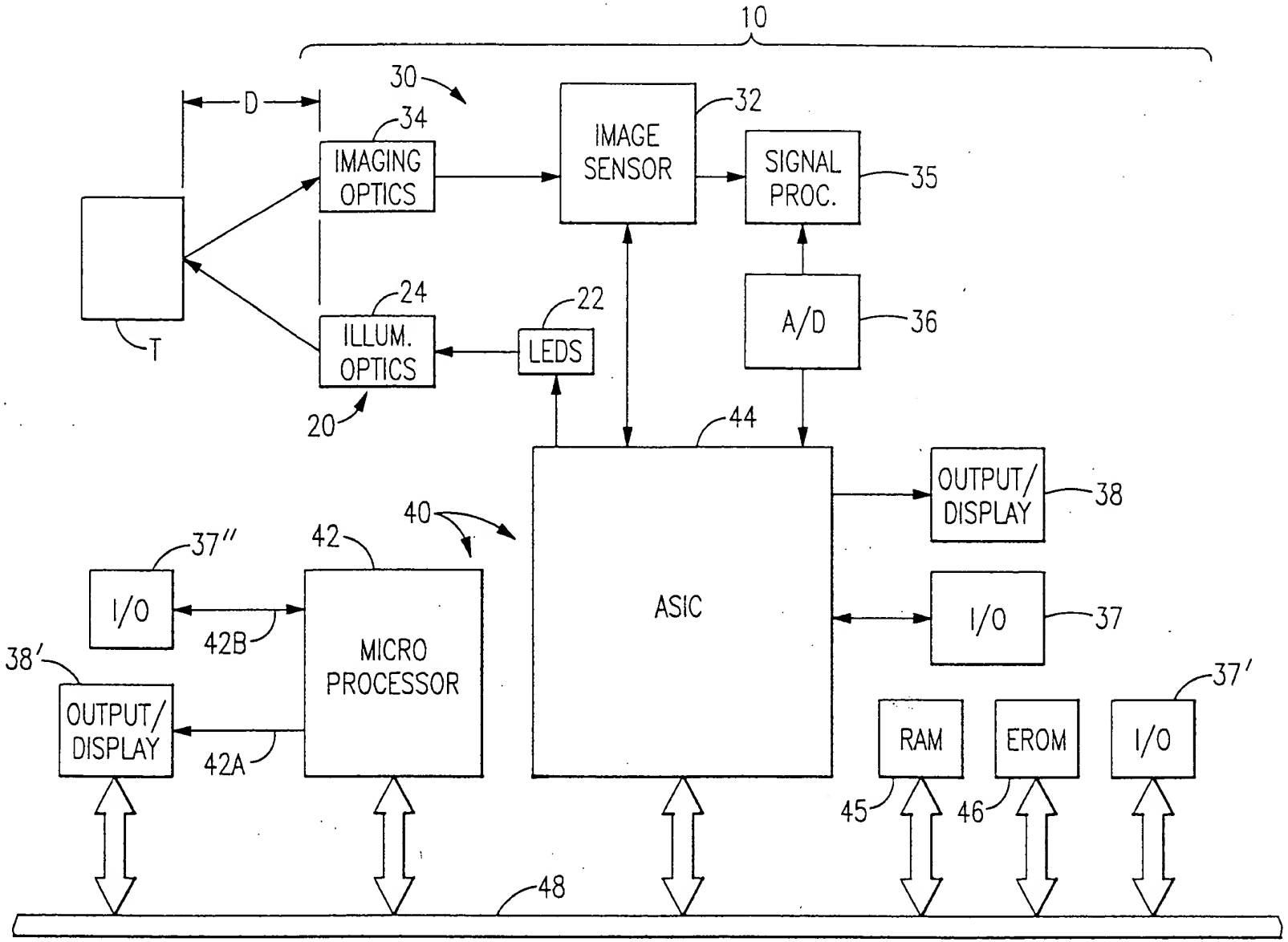


FIG.1

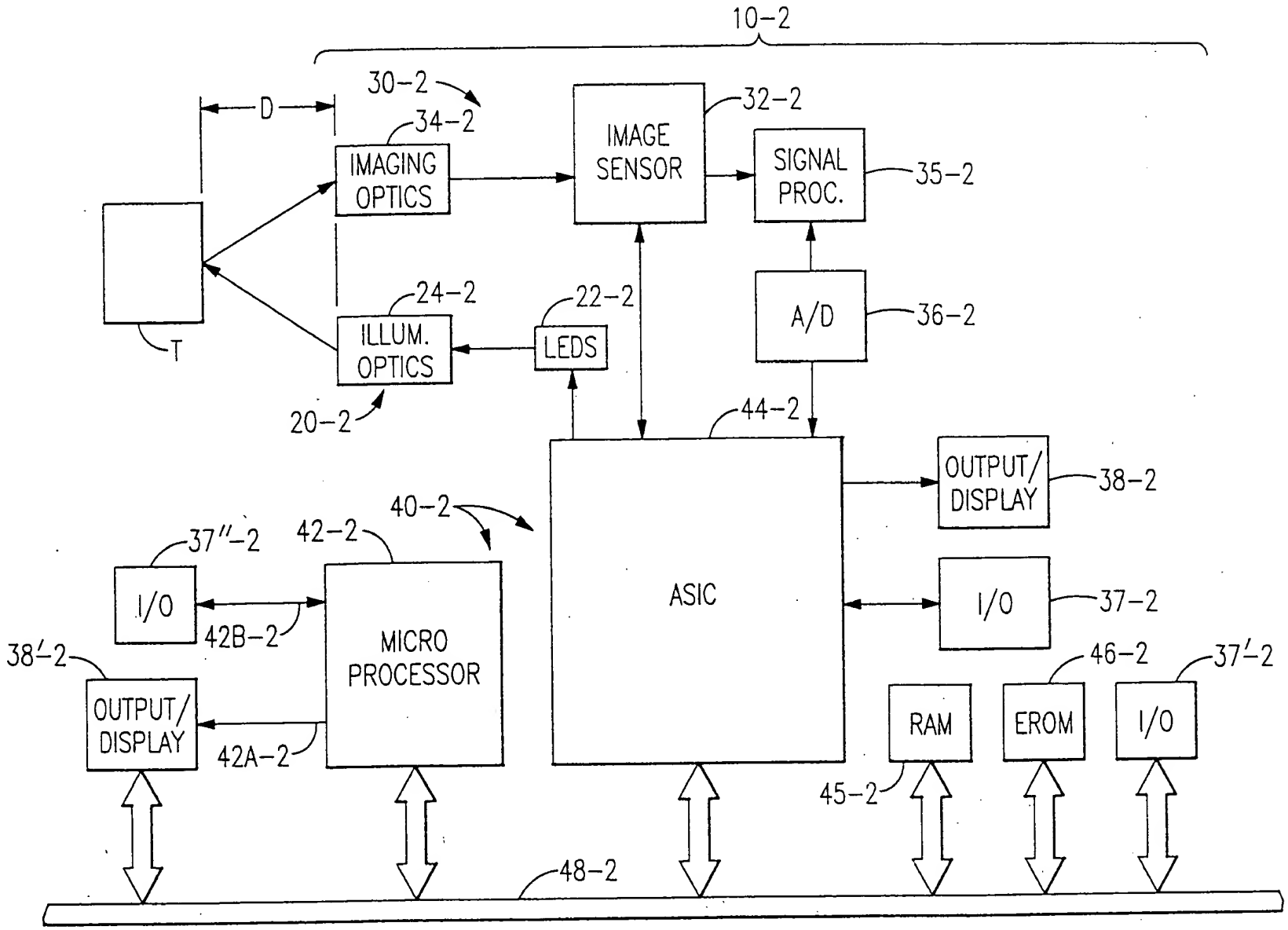


FIG.2

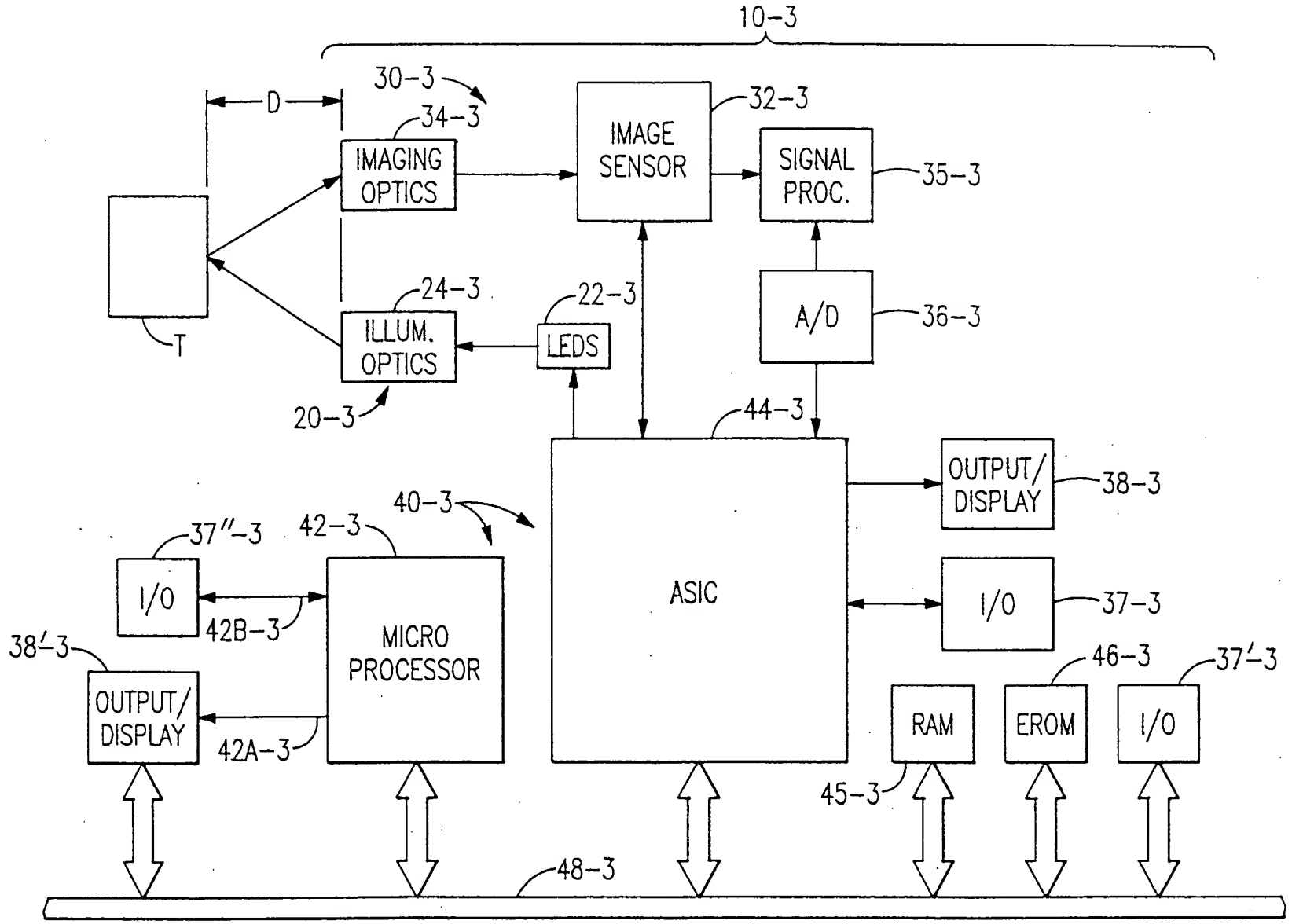

10-3
30-3
D
34-3
IMAGING OPTICS
IMAGE SENSOR
32-3
SIGNAL PROC.
35-3
T
24-3
22-3
ILLUM. OPTICS
LEDS
A/D
36-3
20-3
44-3
OUTPUT/ DISPLAY
38-3
40-3
37''-3
42-3
I/O
ASIC
I/O
37-3
42B-3
MICRO PROCESSOR
38'-3
OUTPUT/ DISPLAY
42A-3
46-3
37'-3
RAM
EROM
I/O
45-3
48-3

FIG.3

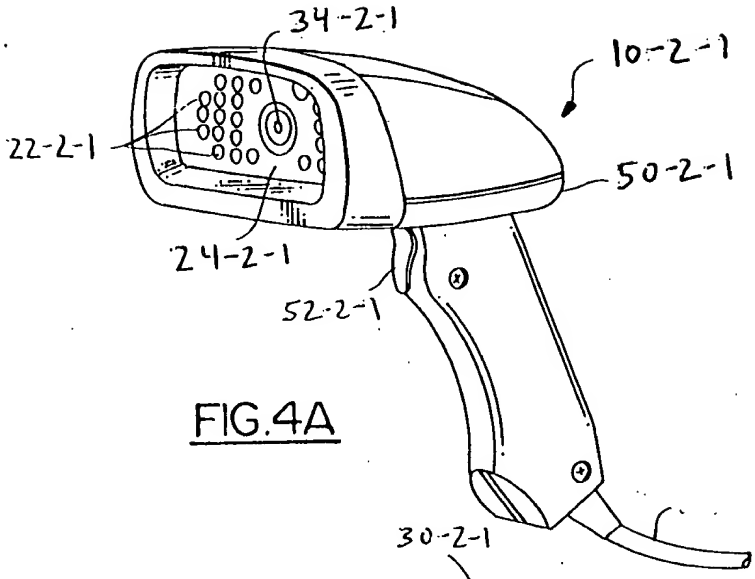


FIG.4A

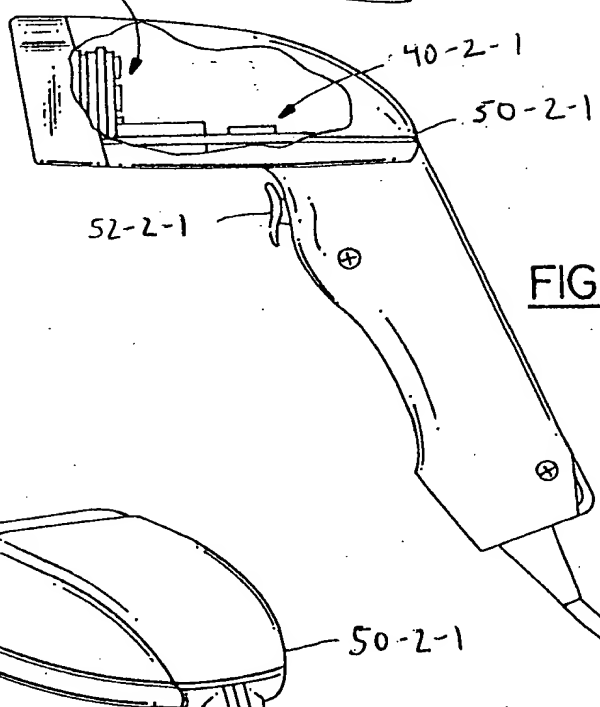


FIG.4B

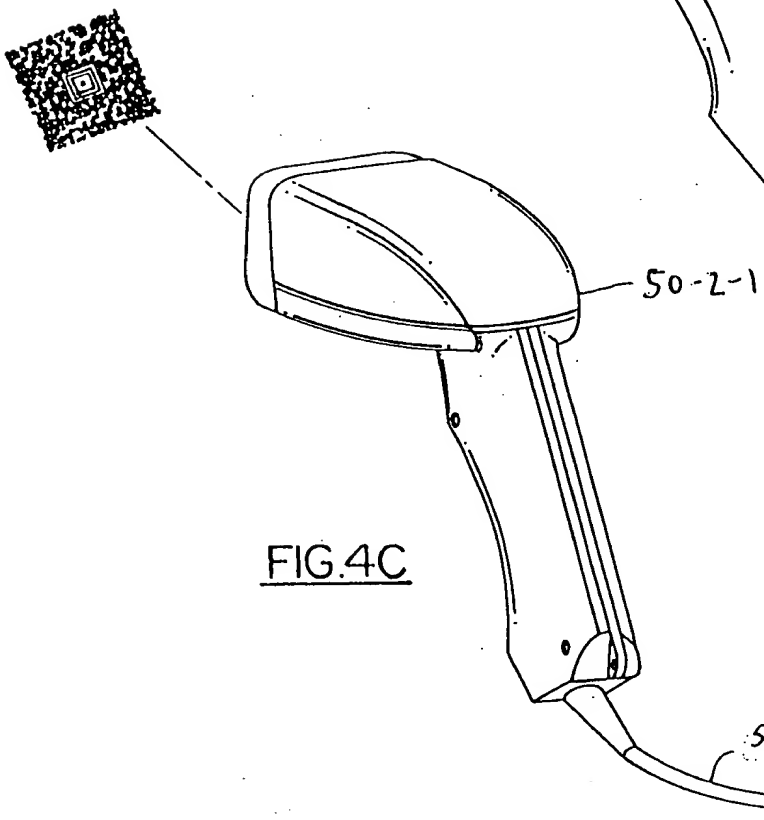


FIG.4C

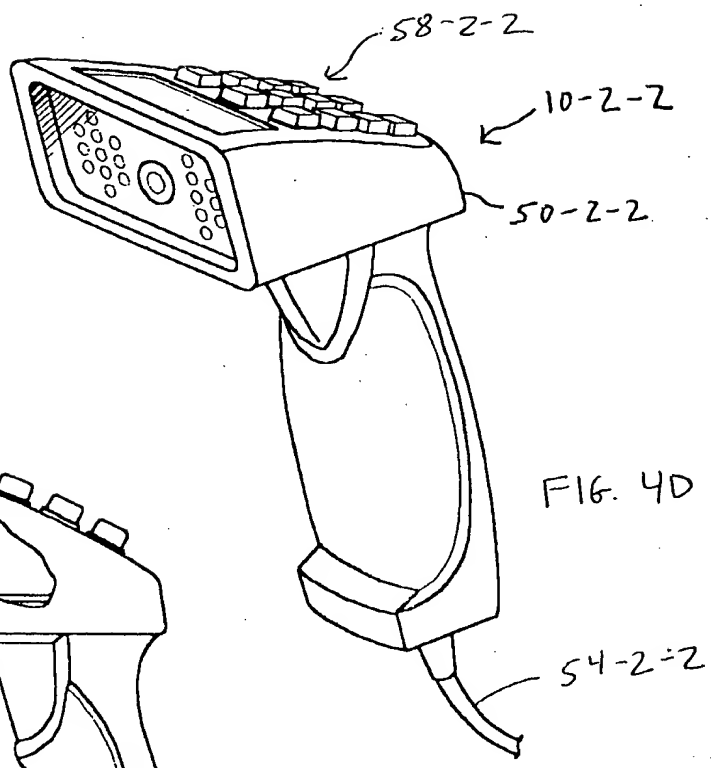


FIG. 4D

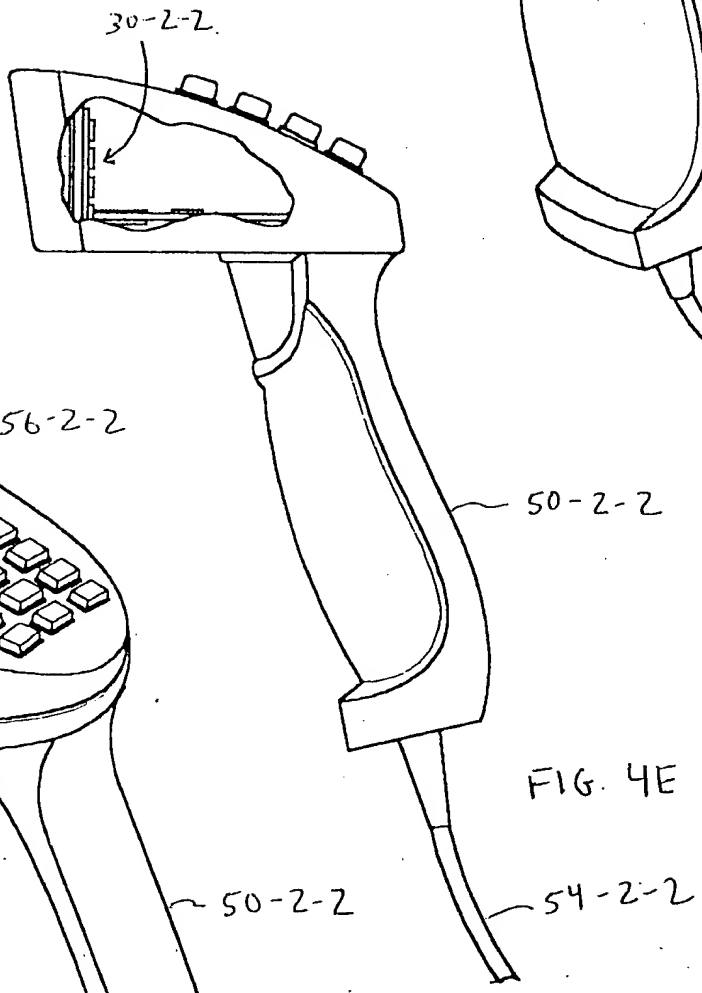


FIG. 4E

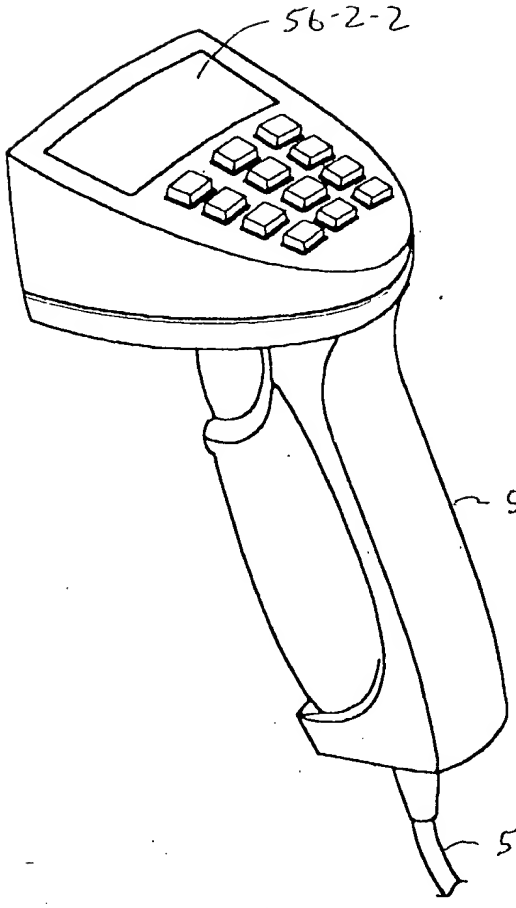


FIG. 4F

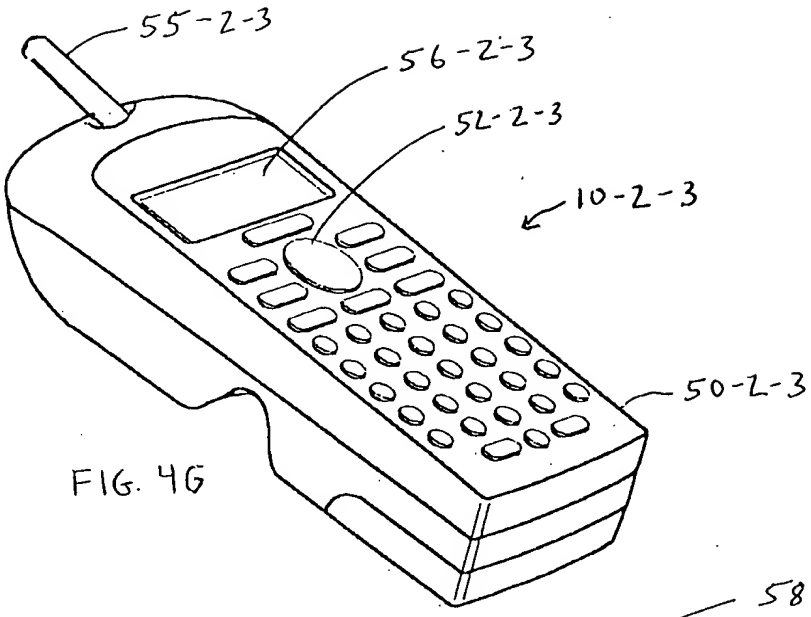


FIG. 4G

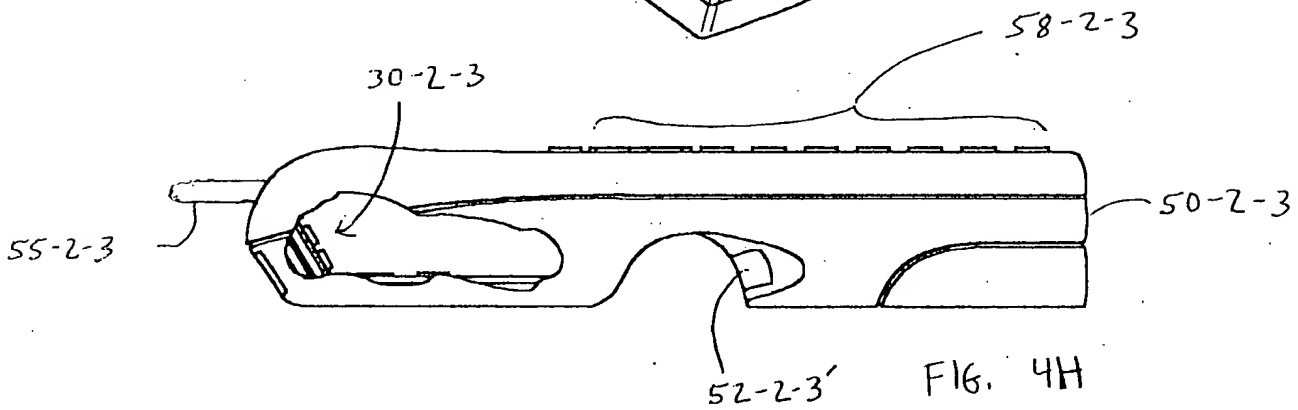


FIG. 4H

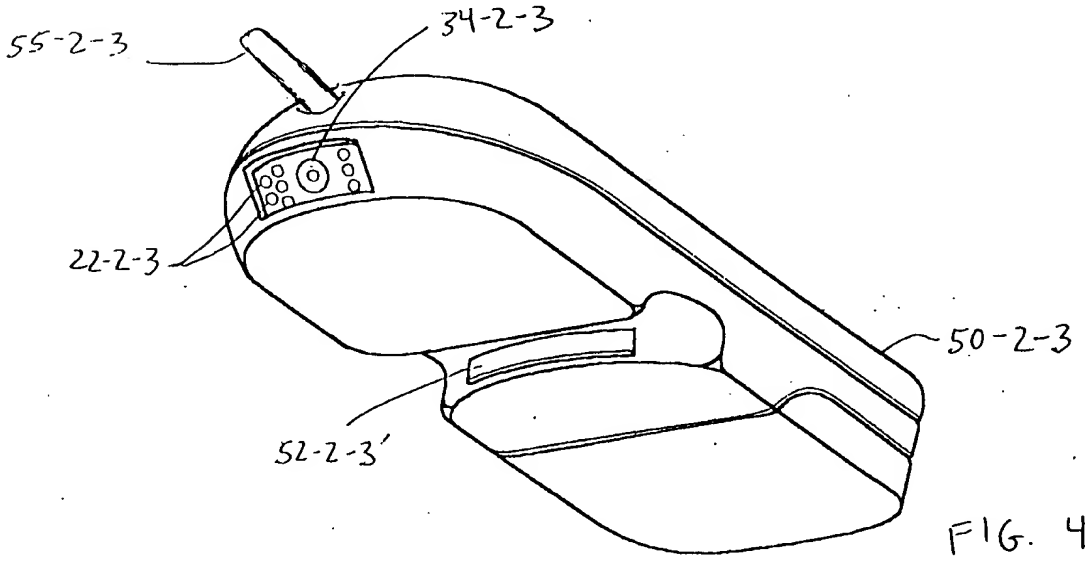


FIG. 4I

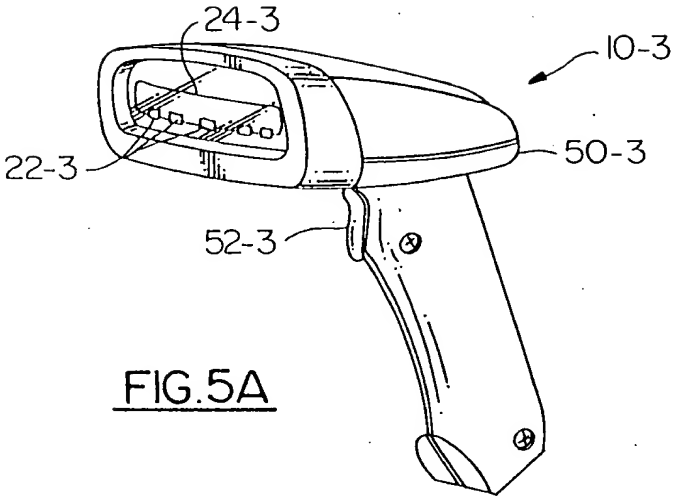


FIG.5A

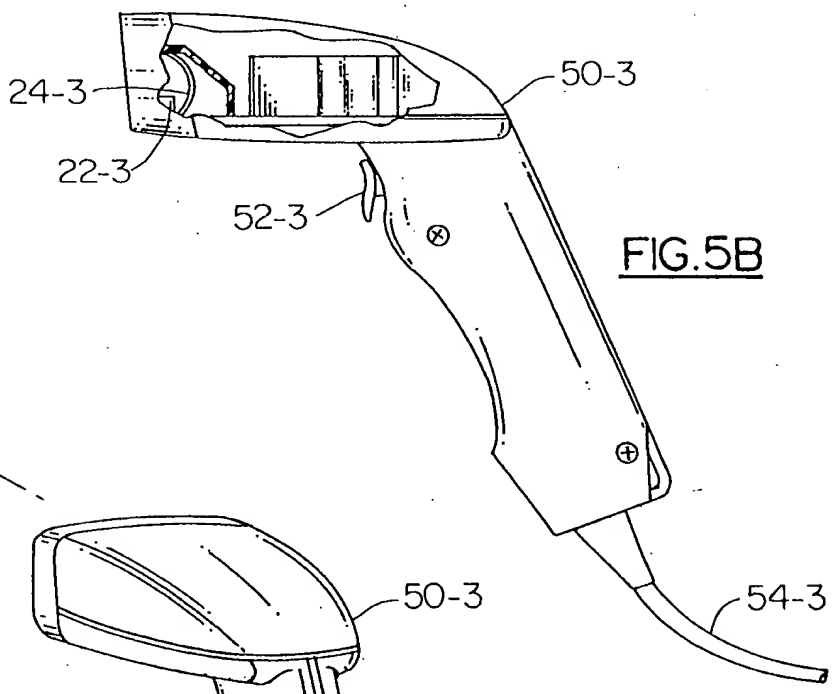


FIG.5B

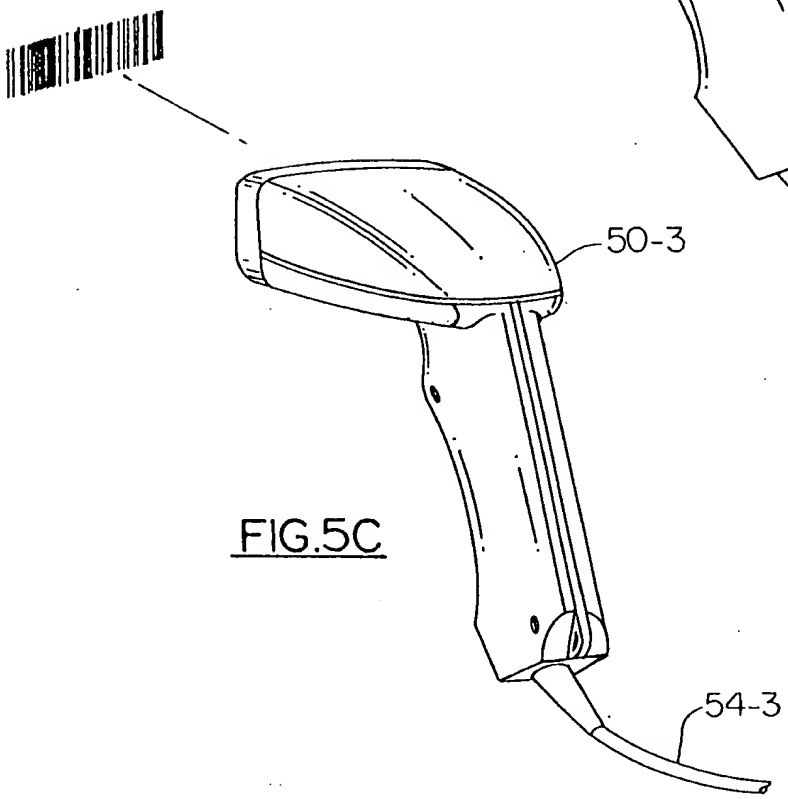


FIG.5C

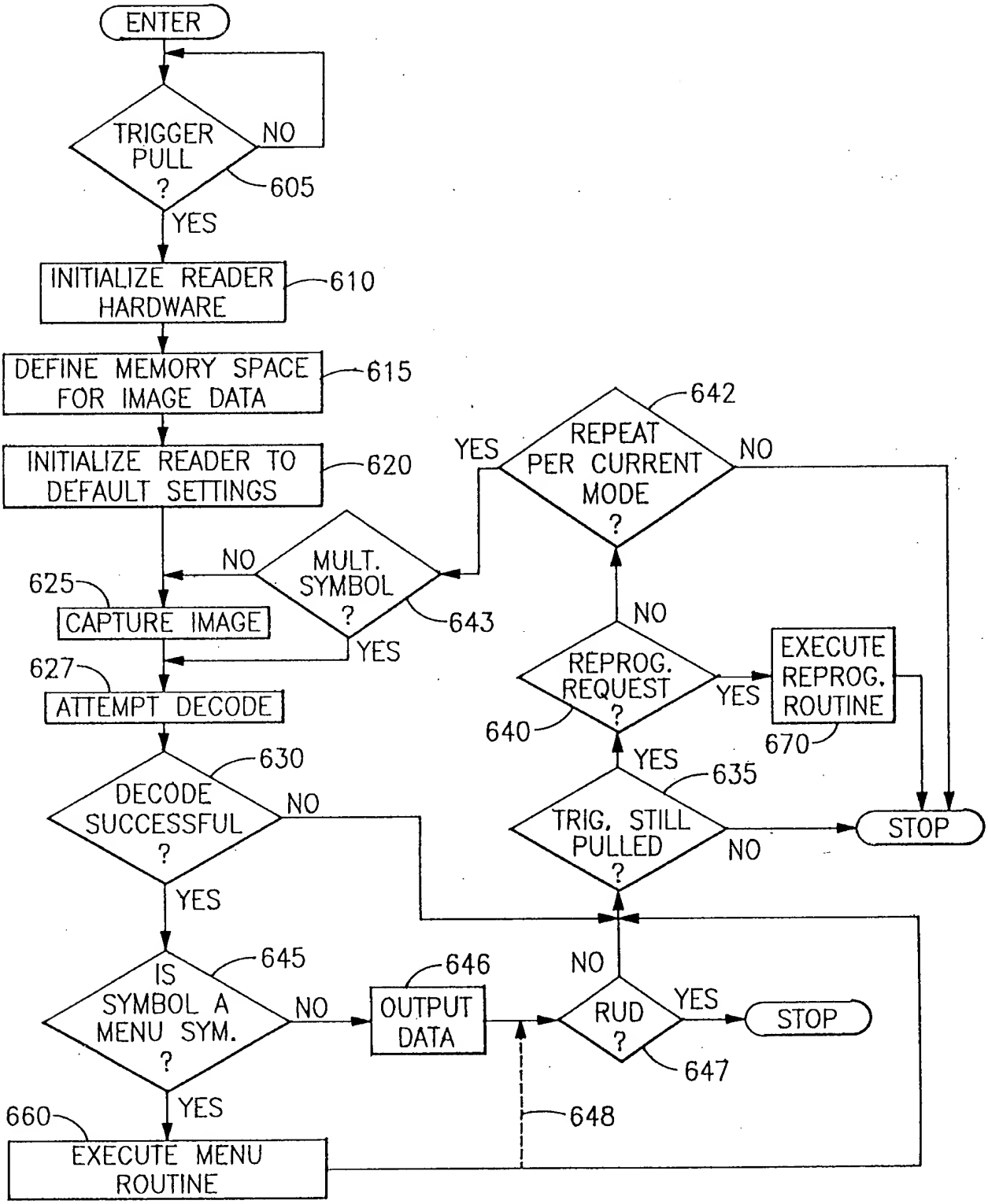

ENTER
TRIGGER PULL ?
NO
605
YES
INITIALIZE READER HARDWARE
610
DEFINE MEMORY SPACE FOR IMAGE DATA
615
INITIALIZE READER TO DEFAULT SETTINGS
620
625
CAPTURE IMAGE
627
ATTEMPT DECODE
630
DECODE SUCCESSFUL ?
NO
YES
645
IS SYMBOL A MENU SYM. ?
NO
646
OUTPUT DATA
660
EXECUTE MENU ROUTINE
MULT. SYMBOL ?
NO
YES
643
642
REPEAT PER CURRENT MODE ?
YES
NO
640
REPROG. REQUEST ?
YES
EXECUTE REPROG. ROUTINE
670
635
TRIG. STILL PULLED ?
YES
NO
STOP
RUD ?
NO
YES
STOP
647
648

FIG. 6A

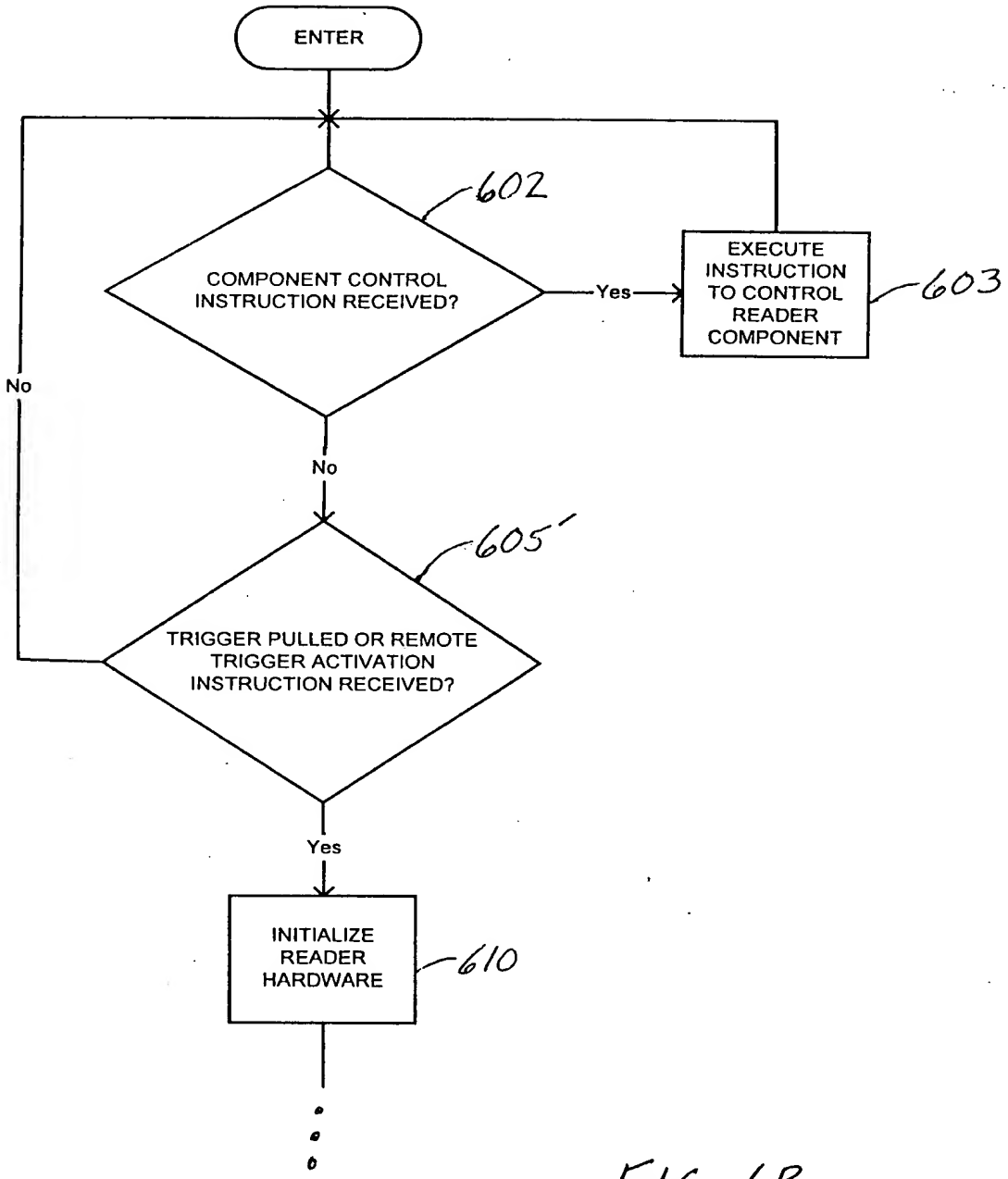

ENTER
602
COMPONENT CONTROL INSTRUCTION RECEIVED?
Yes
EXECUTE INSTRUCTION TO CONTROL READER COMPONENT
603
No
No
605'
TRIGGER PULLED OR REMOTE TRIGGER ACTIVATION INSTRUCTION RECEIVED?
Yes
INITIALIZE READER HARDWARE
610

FIG. 6B

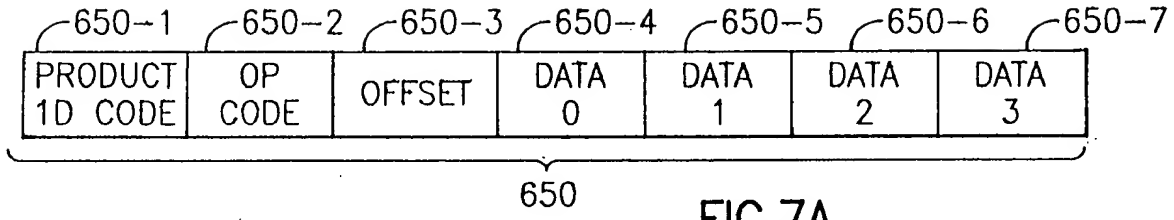


FIG.7A

OPTIONS (OFFSET) TABLE

A. COMMUNICATIONS OPTIONS
   1. RS-232
   2. BAUD RATE
   3. RF LINK
   4. ETHERNET
B. CODE OPTIONS
   1. DISABLE 1D
   2. DISABLE 2D
   3. DISABLE INDIV.
   4. MIN-MAX LENGTH
   5. MULTIPLE SYMBOLS ENABLED
C. SCANNING-DECODING OPTIONS
   1. ONE SHOT
   2. REPEAT UNTIL DONE
   3. REPEAT UNTIL STOPPED
   4. SCAN ON DEMAND
   5. SKIP SCAN
   6. DECODE ON DEMAND
D. OPERATING OPTIONS
   1. BEEPER VOLUME
   2. AIMING LED ON/OFF
   3. AURAL FEEDBACK
E. TRANSMIT OPTIONS
   1. SEND CHECK CHAR'S
   2. SEND CHECKSUM
   3. DATA EDIT OPTIONS

FIG.7B

OP CODE TABLE

A. OP CODE "0"-VECTOR PROC.
   1. OUTPUT VERSION OF SOFTWARE
   2. OUTPUT CONTENTS OF PARAMETER TABLE
   3. DISPLAY ENABLED CODES
   4. PRINT PARAMETER TABLE AS BAR CODE SYMBOL
B. OP CODE "1" - CLEAR
C. OP CODE "2" - SET
D. OP CODE "3" - TOGGLE
E. OP CODE "4" - ADD
F. OP CODE "5" - DEFAULT
G. OP CODE "6" - LOAD
H. OP CODE "7" - RESERVED

FIG.7C

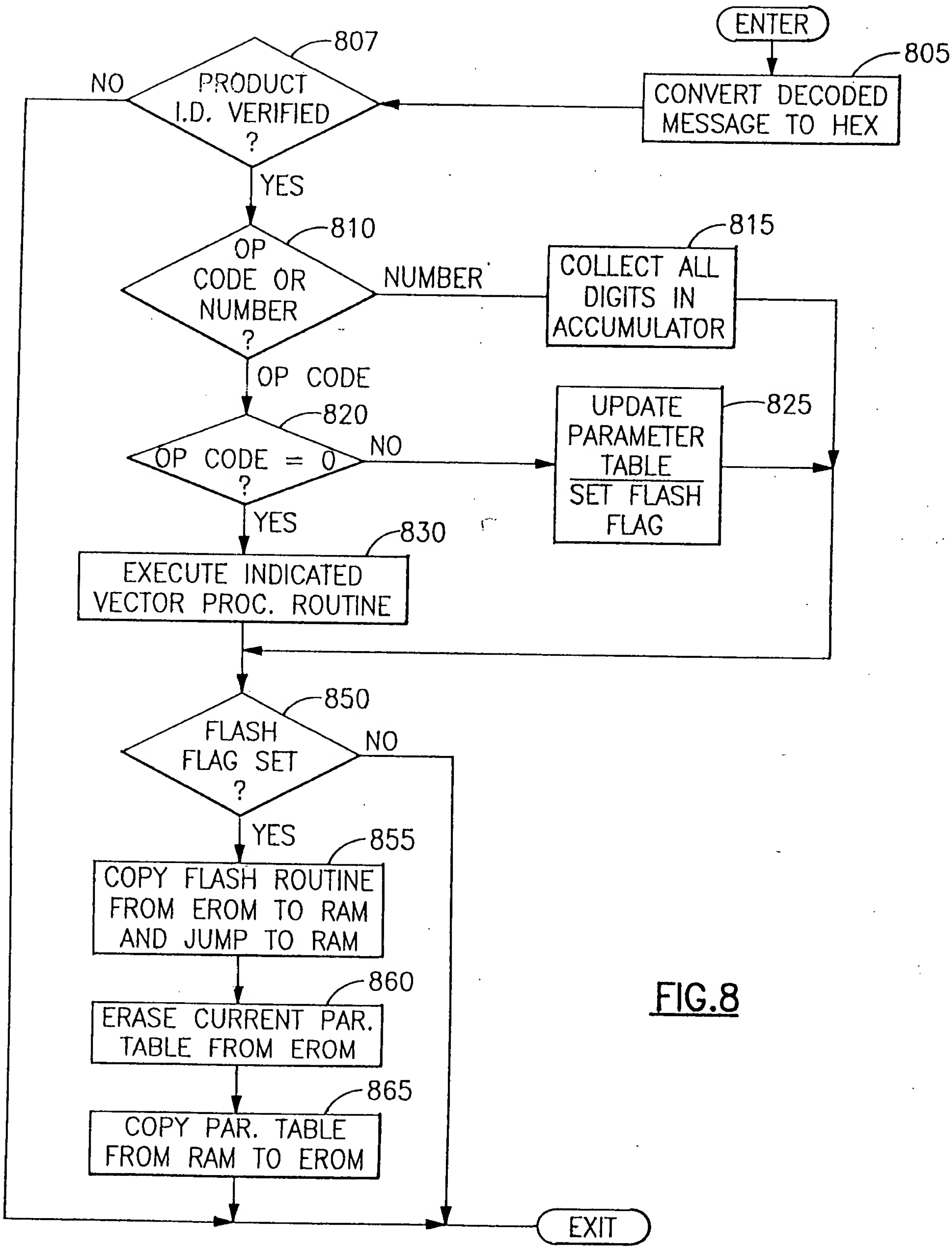
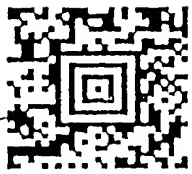

ENTER
CONVERT DECODED MESSAGE TO HEX
805
PRODUCT I.D. VERIFIED ?
807
NO
YES
OP CODE OR NUMBER ?
810
NUMBER
COLLECT ALL DIGITS IN ACCUMULATOR
815
OP CODE
OP CODE = 0 ?
820
NO
UPDATE PARAMETER TABLE
SET FLASH FLAG
825
YES
EXECUTE INDICATED VECTOR PROC. ROUTINE
830
FLASH FLAG SET ?
850
NO
YES
COPY FLASH ROUTINE FROM EROM TO RAM AND JUMP TO RAM
855
ERASE CURRENT PAR. TABLE FROM EROM
860
COPY PAR. TABLE FROM RAM TO EROM
865
EXIT

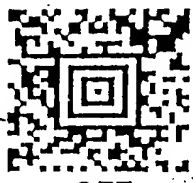
FIG.8

FIG.8A

CODE 128 SELECTION

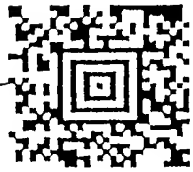

802

*ON

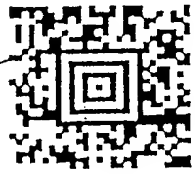

804

OFF

UPC A SELECTION


806

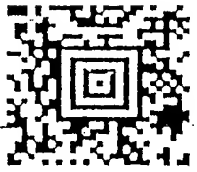
*ON


808

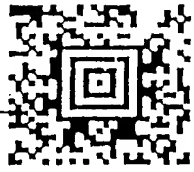
OFF

FIG.8B

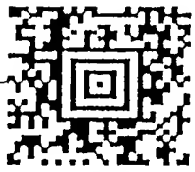
BAUD RATE SELECTION


812

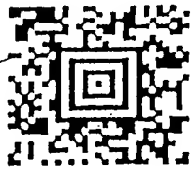
1200


814

9600


816

19200


818

*38400

FIG.8C

DEFAULT ALL CODE 11/CODE 128 SETTINGS

822

CODE 11 SELECTION

824 *ON

CODE 11

826 OFF

828 *2 CHECK DIGITS

CHECK DIGITS REQUIRED

832 1 CHECK DIGIT

834 MINIMUM ‡

MESSAGE LENGTH

836 MAXIMUM ‡

CODE 128 SELECTION

848 *ON

CODE 128

852 OFF

854 MINIMUM ‡

MESSAGE LENGTH

856 MAXIMUM ‡

‡ A TWO-DIGIT NUMBER IS REQUIRED AFTER SCANNING THIS PROGRAMMING BAR CODE. PLEASE SCAN YOUR SELECTION ON THE PROGRAMMING CHART (INSIDE BACK COVER).

RS-232D PORT 2 (D OUTPUT)

DEFAULT ALL RS-232 PORT 2 SETTINGS

858

CTS CHECK SELECTION

862 ENABLE

864 *DISABLE

BAUD RATE SELECTION

866 300

868 600

872 1200

874 2400

876 4800

878 *9600

882 19200

884 38400

FIG.8D

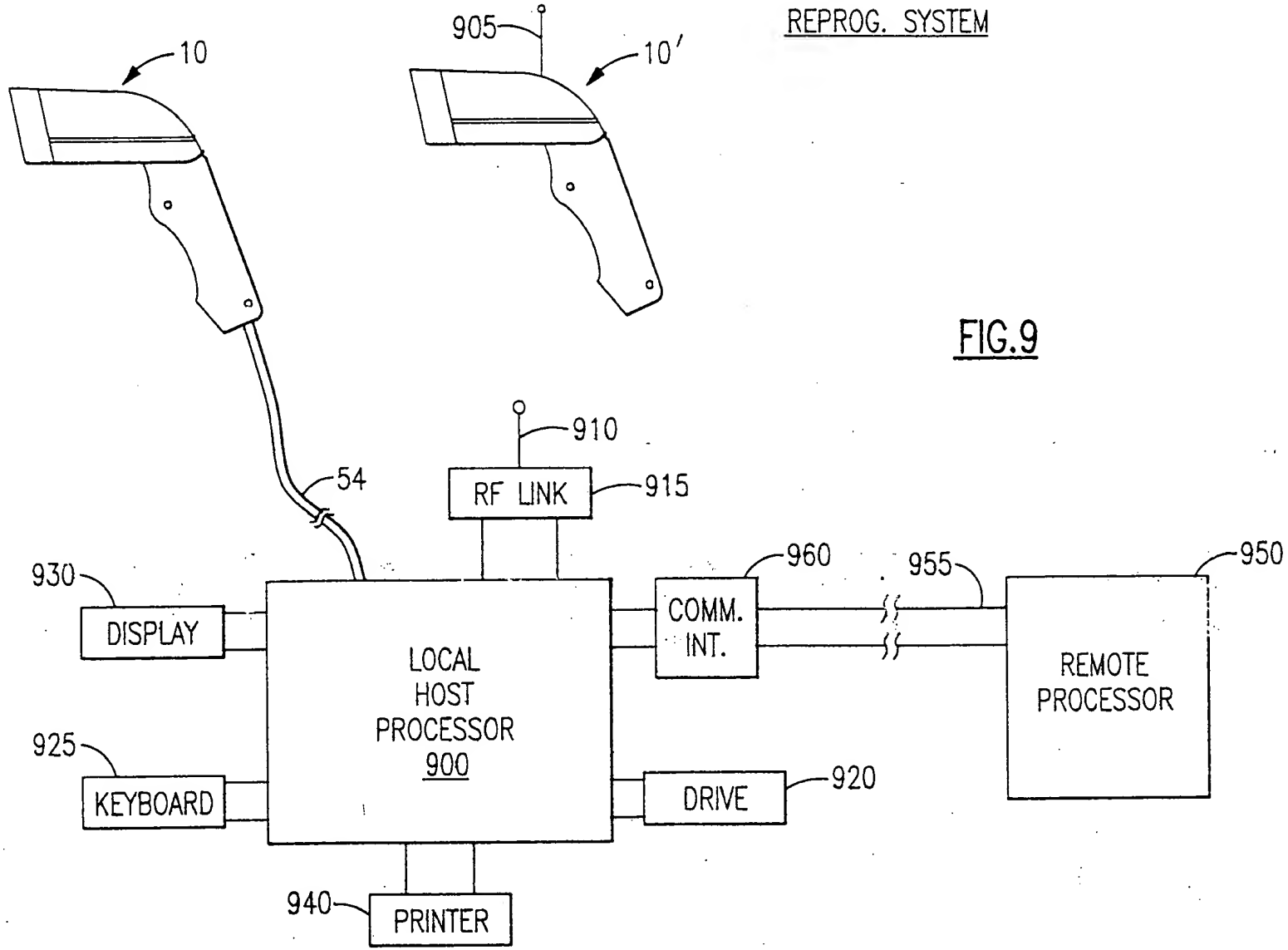


FIG.9

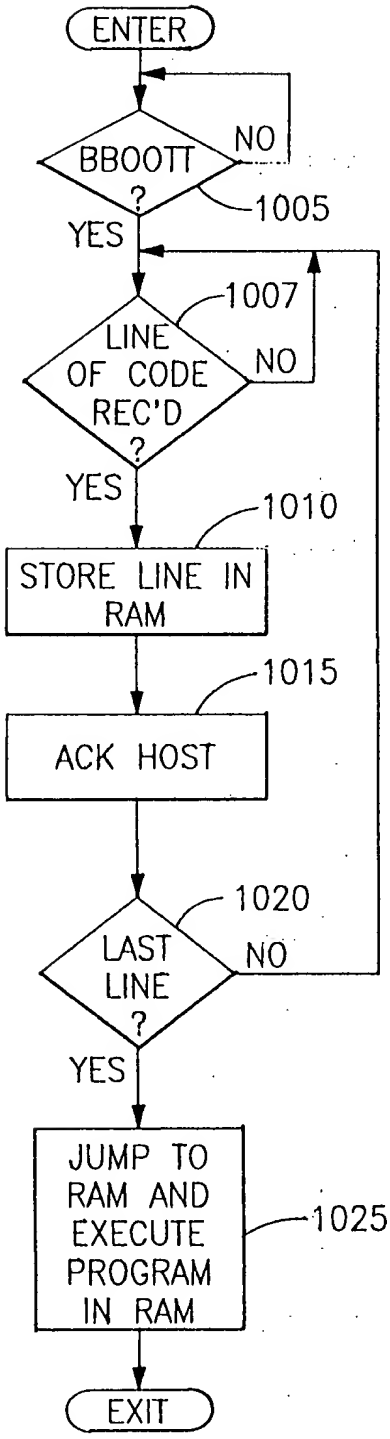


FIG. 10A

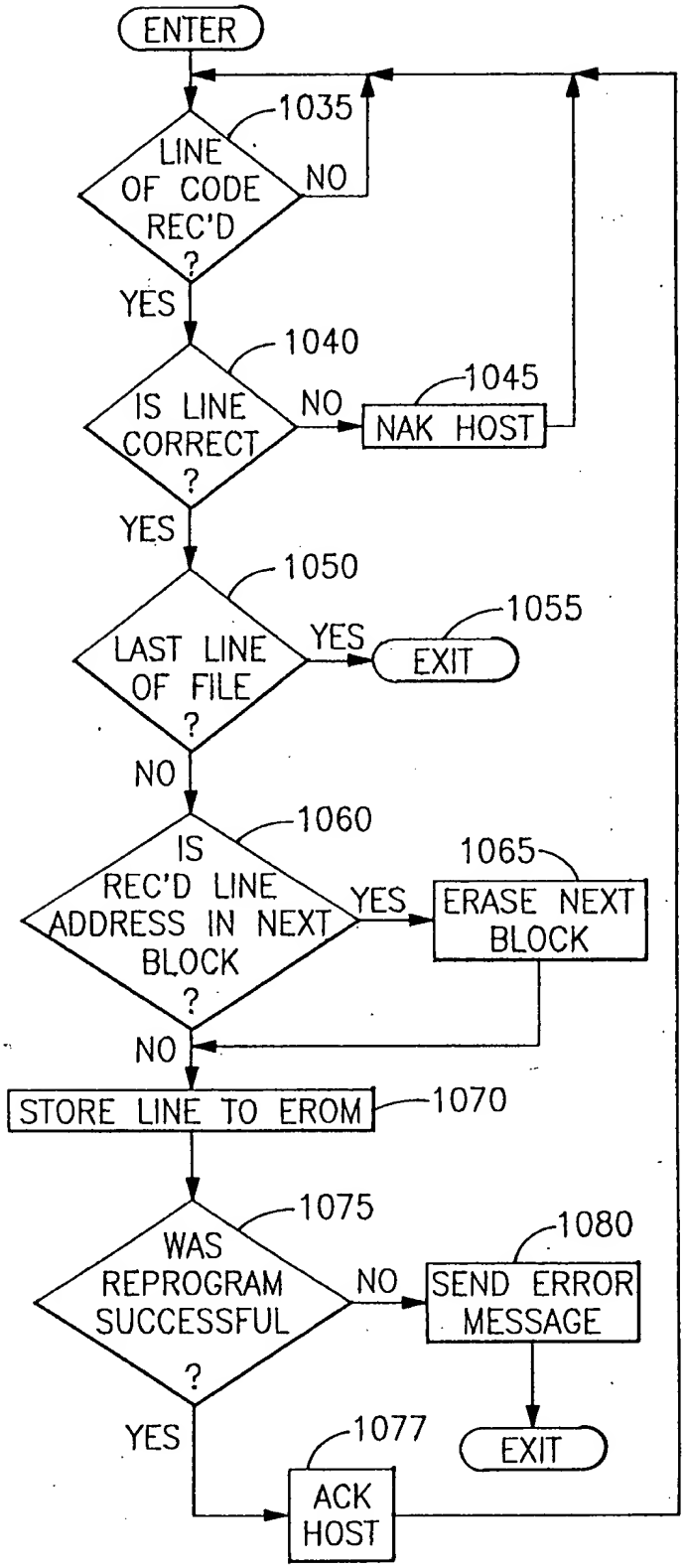


FIG. 10B

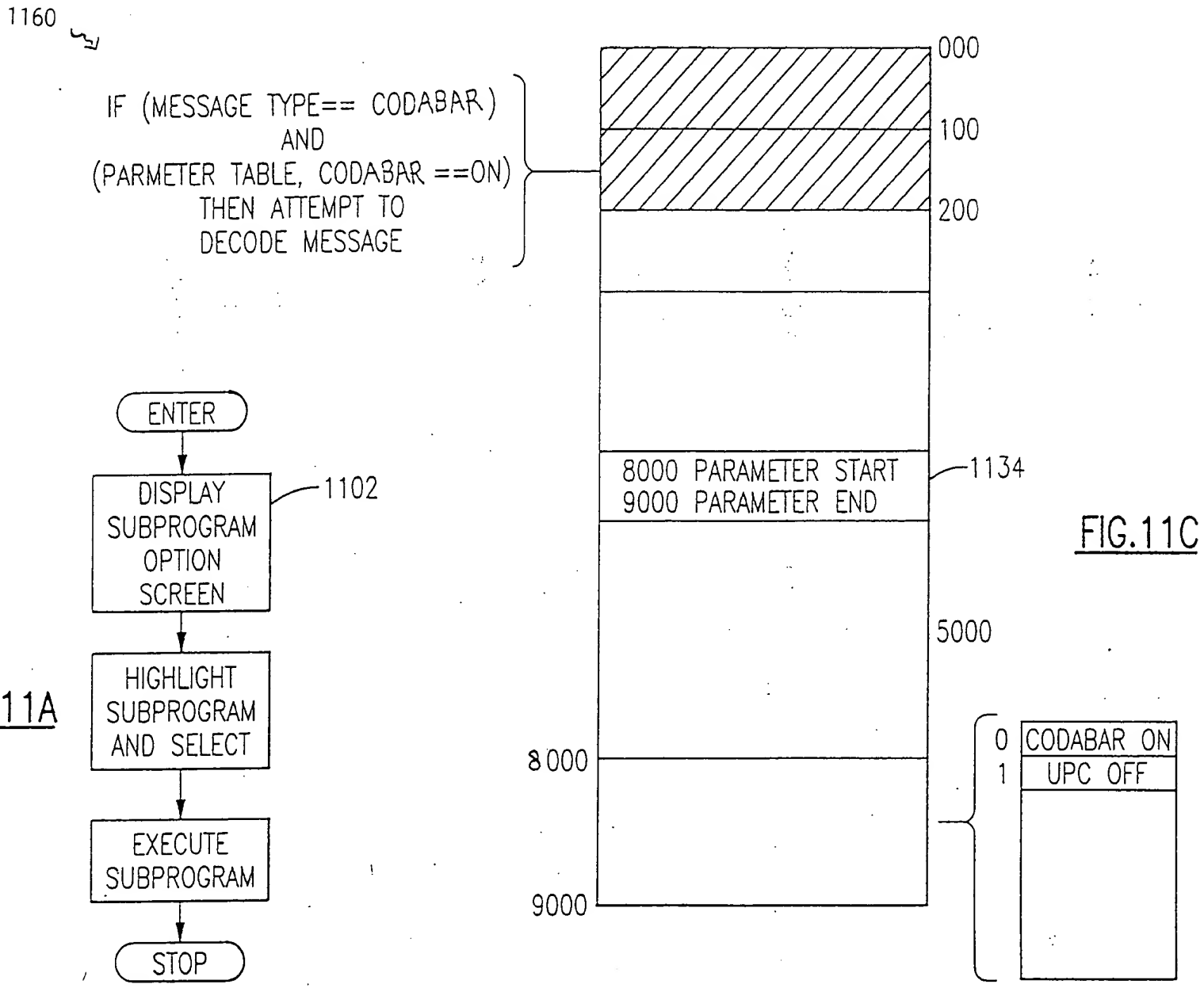


FIG.11C

FIG.11A

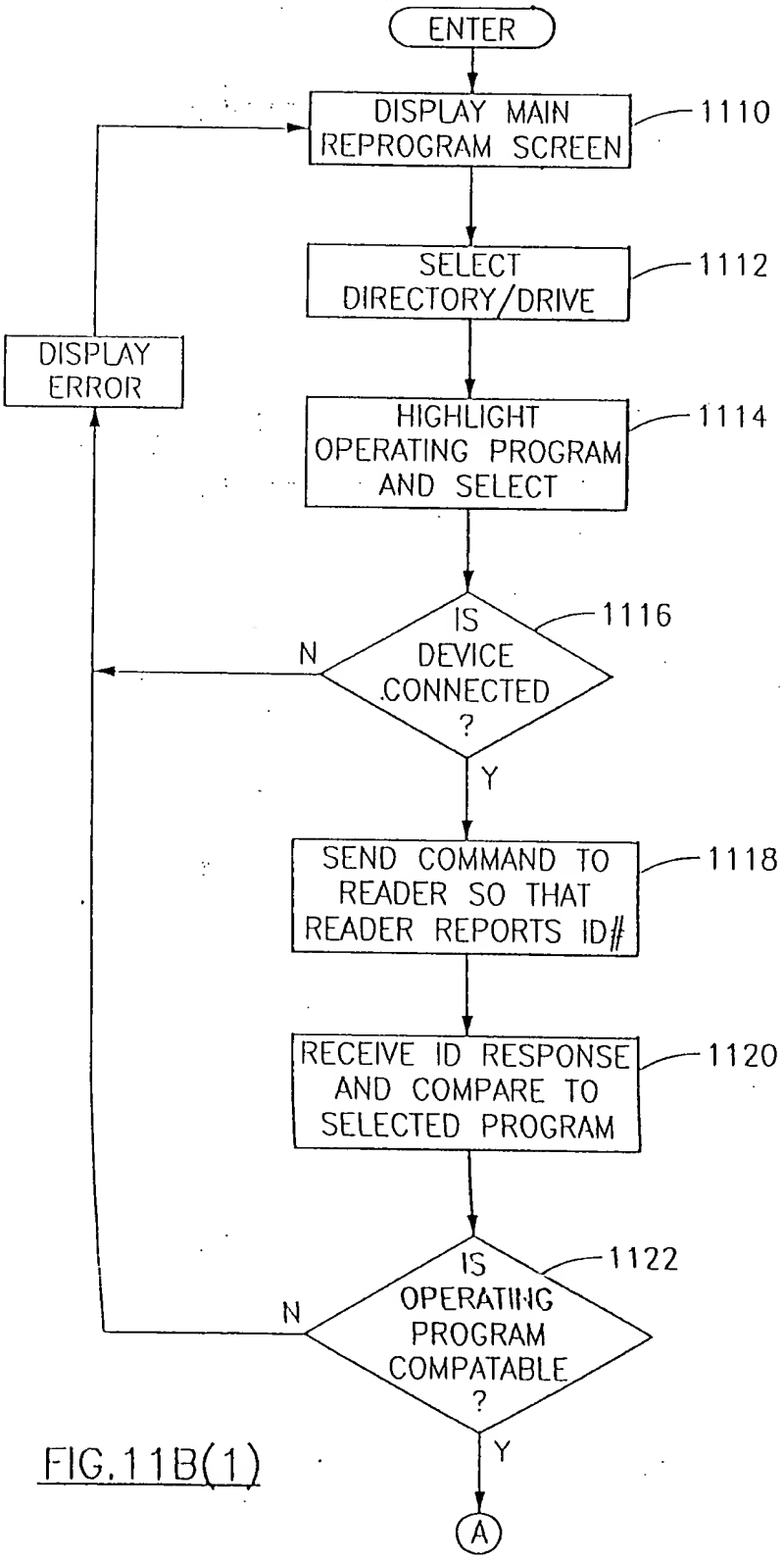


FIG. 11B(1)

FIG. 11B(1)

FIG. 11B(2)

FIG. 11B

FIG.11B(2)

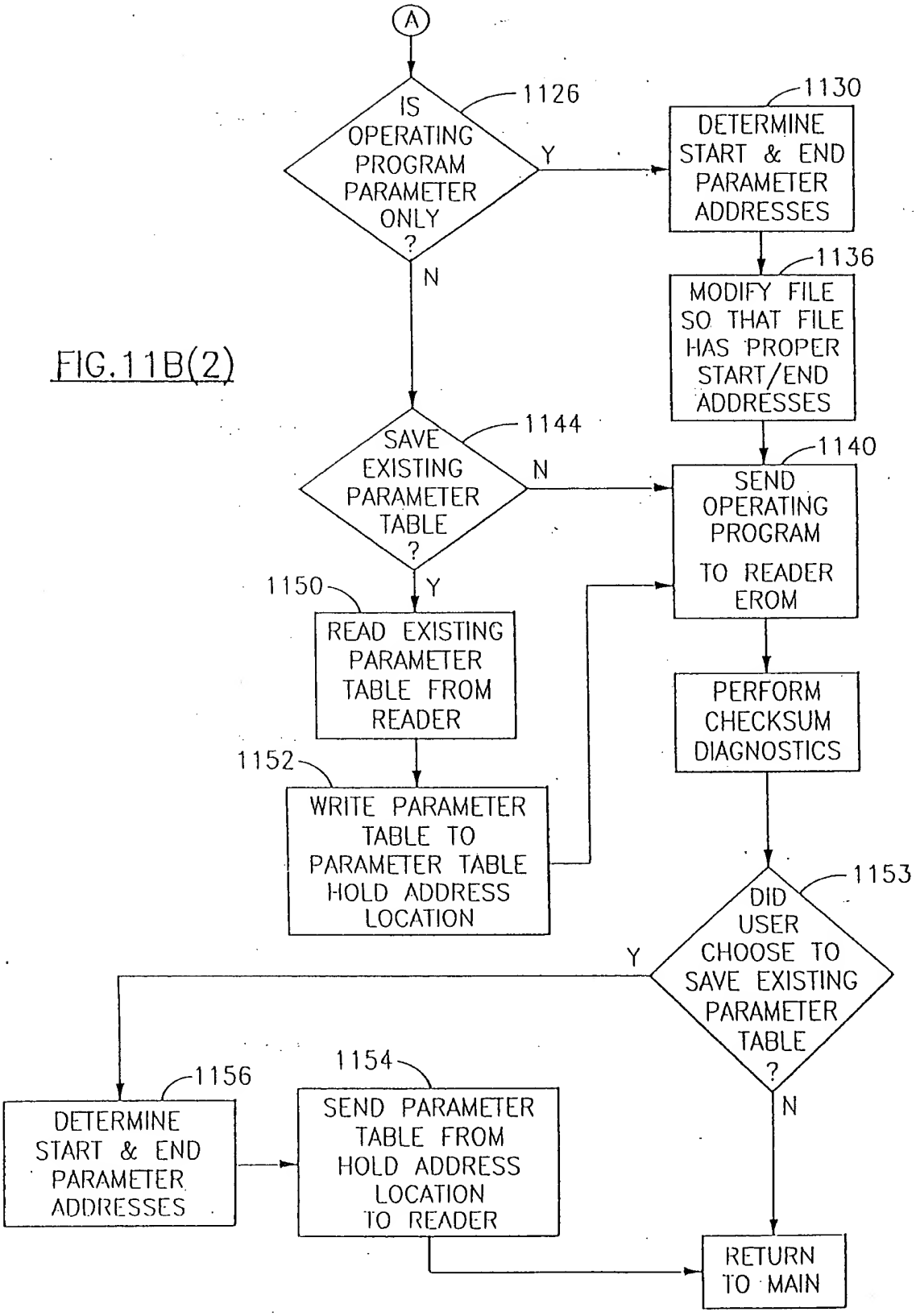

A
IS OPERATING PROGRAM PARAMETER ONLY ?
1126
Y
N
DETERMINE START & END PARAMETER ADDRESSES
1130
MODIFY FILE SO THAT FILE HAS PROPER START/END ADDRESSES
1136
SAVE EXISTING PARAMETER TABLE ?
1144
N
Y
SEND OPERATING PROGRAM TO READER EROM
1140
READ EXISTING PARAMETER TABLE FROM READER
1150
WRITE PARAMETER TABLE TO PARAMETER TABLE HOLD ADDRESS LOCATION
1152
PERFORM CHECKSUM DIAGNOSTICS
DID USER CHOOSE TO SAVE EXISTING PARAMETER TABLE ?
1153
Y
N
DETERMINE START & END PARAMETER ADDRESSES
1156
SEND PARAMETER TABLE FROM HOLD ADDRESS LOCATION TO READER
1154
RETURN TO MAIN

FIG. 11D(1)

FIG. 11D(2)

FIG. 11D

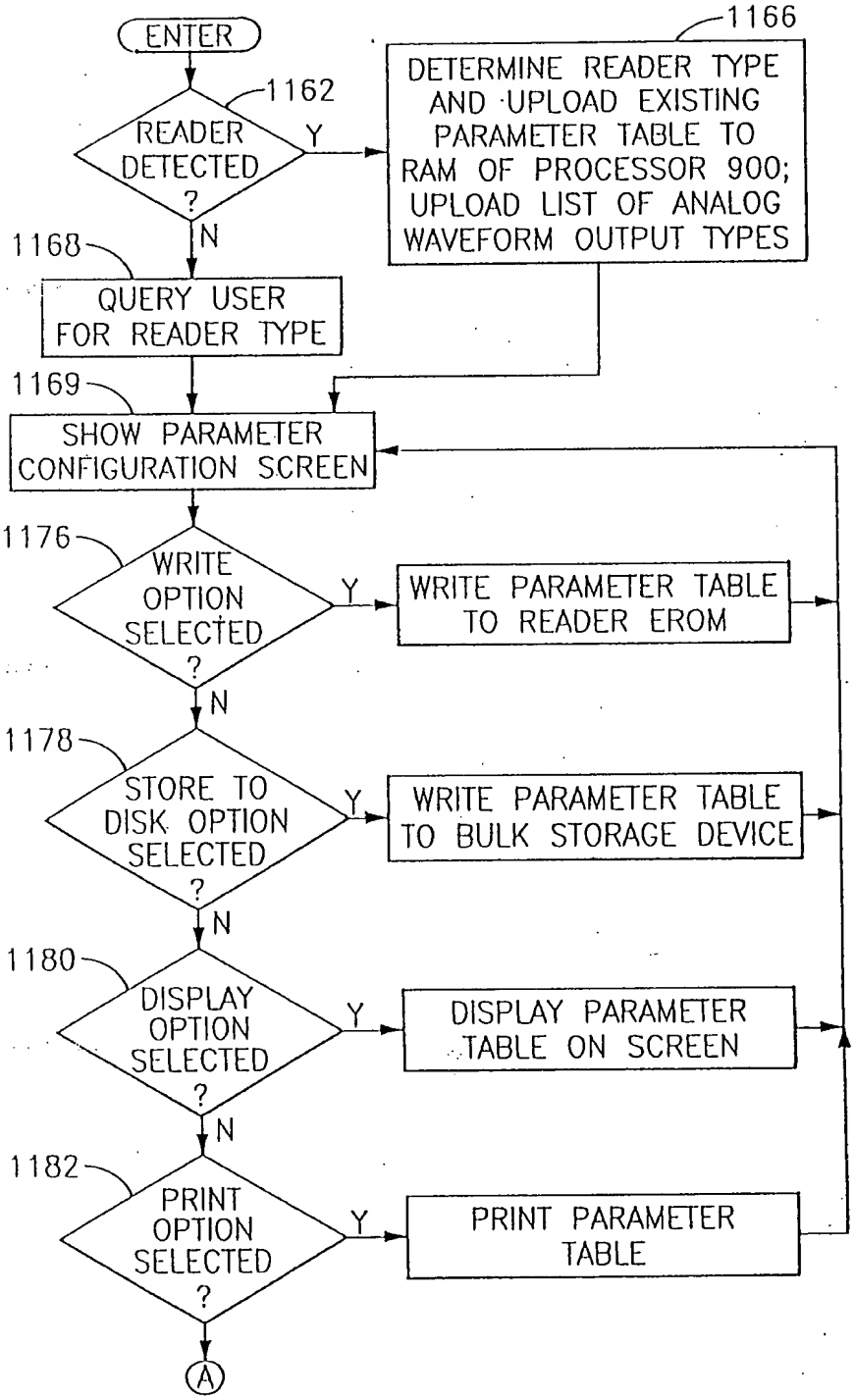


FIG. 11D(1)

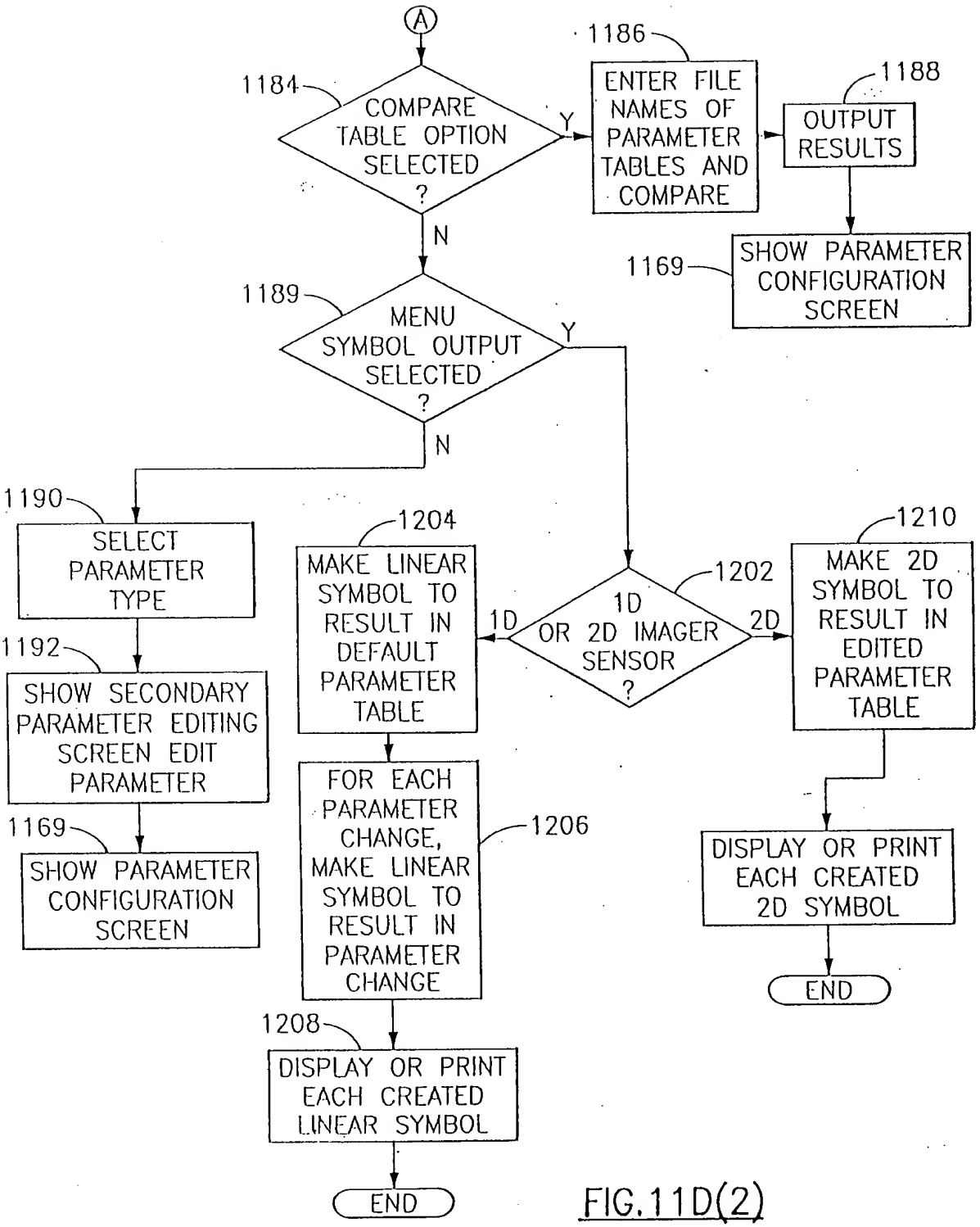

A
1184
COMPARE TABLE OPTION SELECTED ?
Y
1186
ENTER FILE NAMES OF PARAMETER TABLES AND COMPARE
1188
OUTPUT RESULTS
1169
SHOW PARAMETER CONFIGURATION SCREEN
N
1189
MENU SYMBOL OUTPUT SELECTED ?
Y
N
1190
SELECT PARAMETER TYPE
1192
SHOW SECONDARY PARAMETER EDITING SCREEN EDIT PARAMETER
1169
SHOW PARAMETER CONFIGURATION SCREEN
1204
MAKE LINEAR SYMBOL TO RESULT IN DEFAULT PARAMETER TABLE
1202
1D OR 2D IMAGER SENSOR ?
1D
2D
1210
MAKE 2D SYMBOL TO RESULT IN EDITED PARAMETER TABLE
FOR EACH PARAMETER CHANGE, MAKE LINEAR SYMBOL TO RESULT IN PARAMETER CHANGE
1206
1208
DISPLAY OR PRINT EACH CREATED LINEAR SYMBOL
DISPLAY OR PRINT EACH CREATED 2D SYMBOL
END
END

FIG.11D(2)

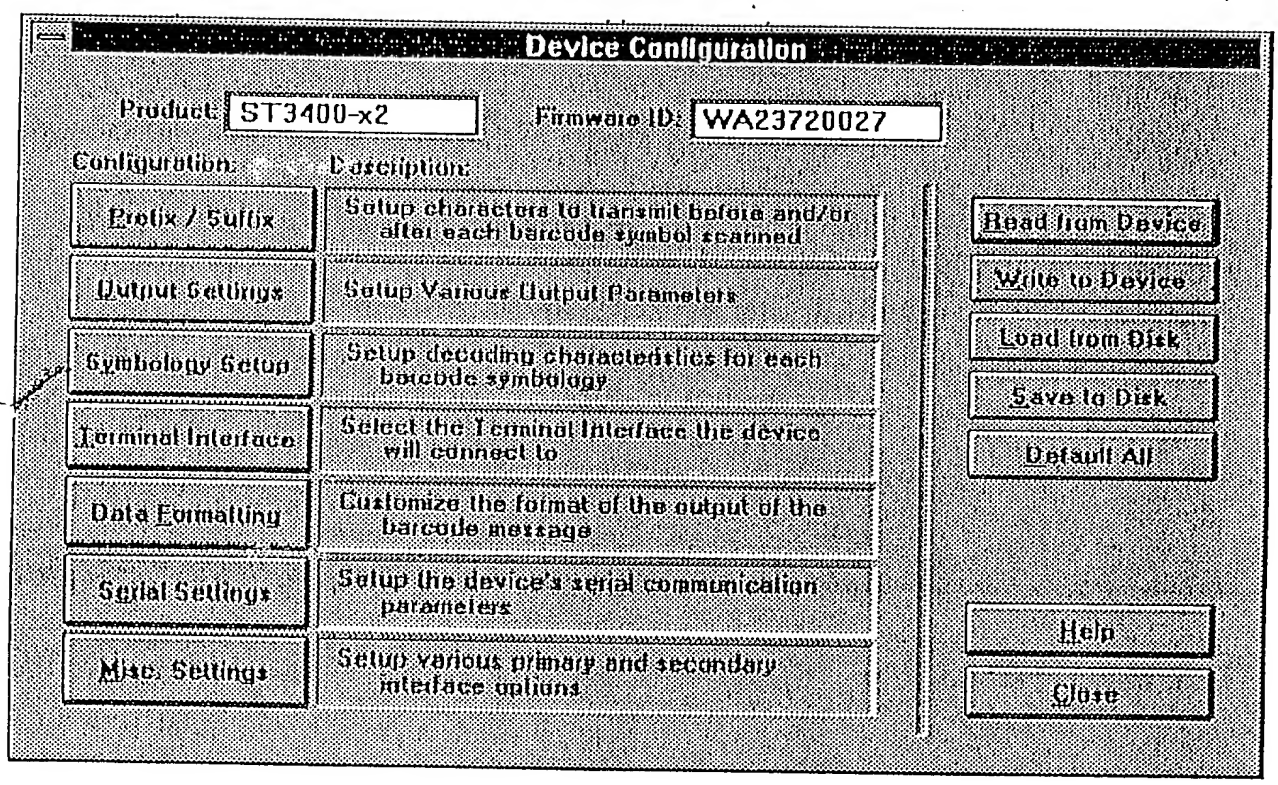

Device Configuration
Product: ST3400-x2
Firmware ID: WA23720027
Configuration:
Description:
Prefix / Suffix
Setup characters to transmit before and/or after each barcode symbol scanned
Output Settings
Setup Various Output Parameters
Symbology Setup
Setup decoding characteristics for each barcode symbology
Terminal Interface
Select the Terminal Interface the device will connect to
Data Formatting
Customize the format of the output of the barcode message
Serial Settings
Setup the device's serial communication parameters
Misc. Settings
Setup various primary and secondary interface options
Read from Device
Write to Device
Load from Disk
Save to Disk
Default All
Help
Close
1174

FIG. 11E

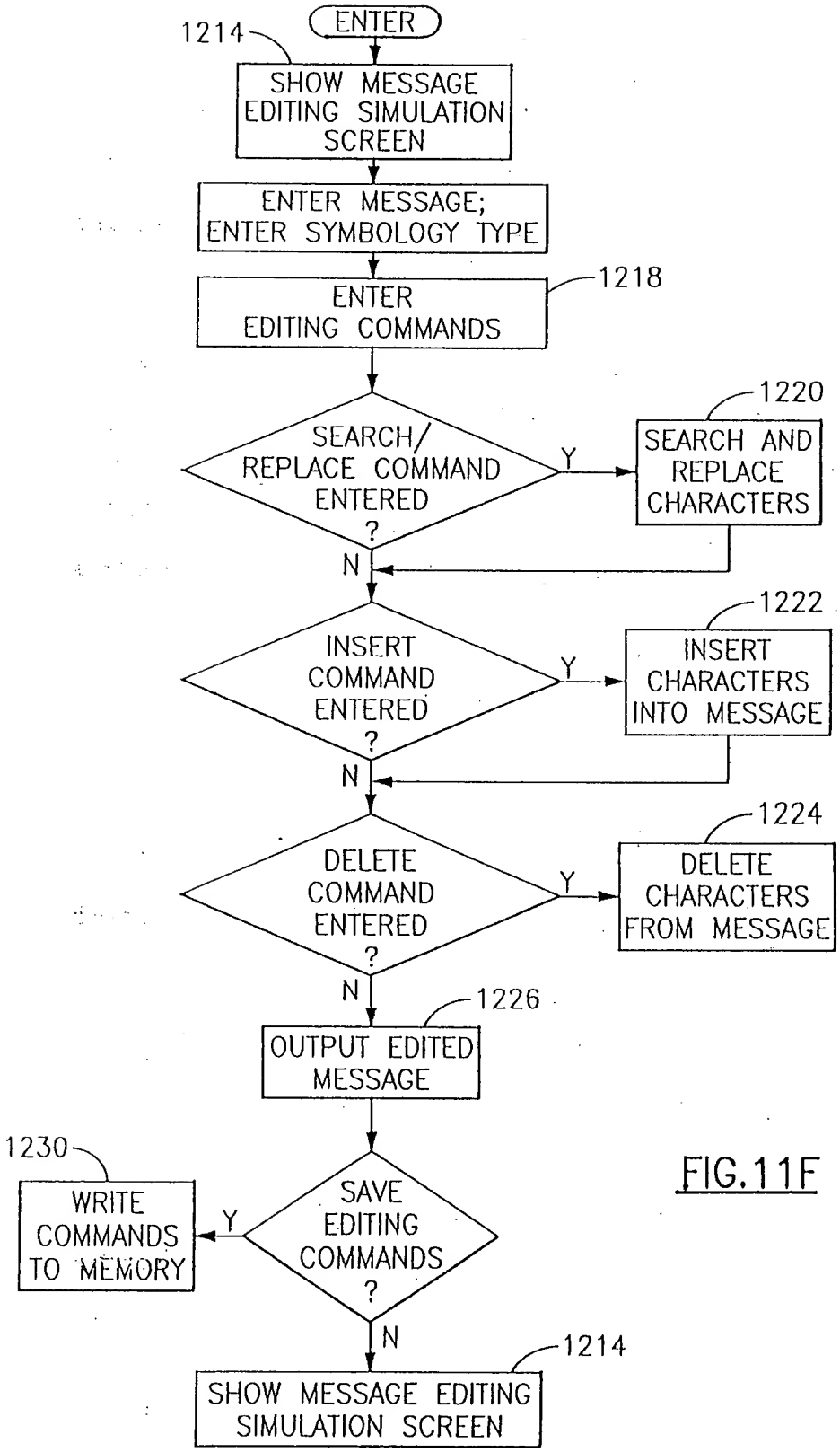

ENTER
1214
SHOW MESSAGE EDITING SIMULATION SCREEN
ENTER MESSAGE; ENTER SYMBOLOGY TYPE
ENTER EDITING COMMANDS
1218
SEARCH/ REPLACE COMMAND ENTERED ?
Y
1220
SEARCH AND REPLACE CHARACTERS
N
INSERT COMMAND ENTERED ?
Y
1222
INSERT CHARACTERS INTO MESSAGE
N
DELETE COMMAND ENTERED ?
Y
1224
DELETE CHARACTERS FROM MESSAGE
N
1226
OUTPUT EDITED MESSAGE
1230
WRITE COMMANDS TO MEMORY
Y
SAVE EDITING COMMANDS ?
N
1214
SHOW MESSAGE EDITING SIMULATION SCREEN

FIG.11F

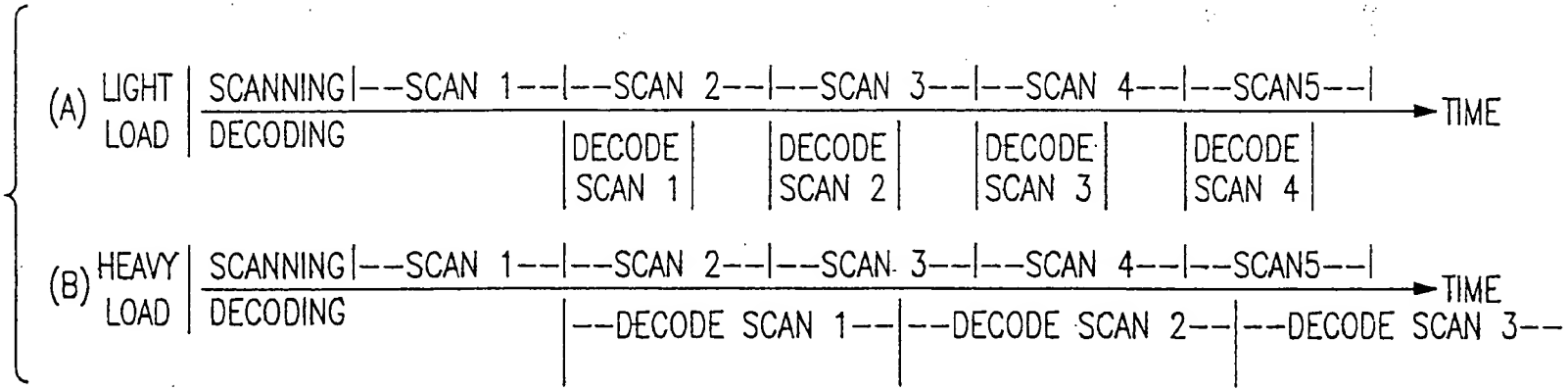


FIG.12
Prior Art

FIG.13

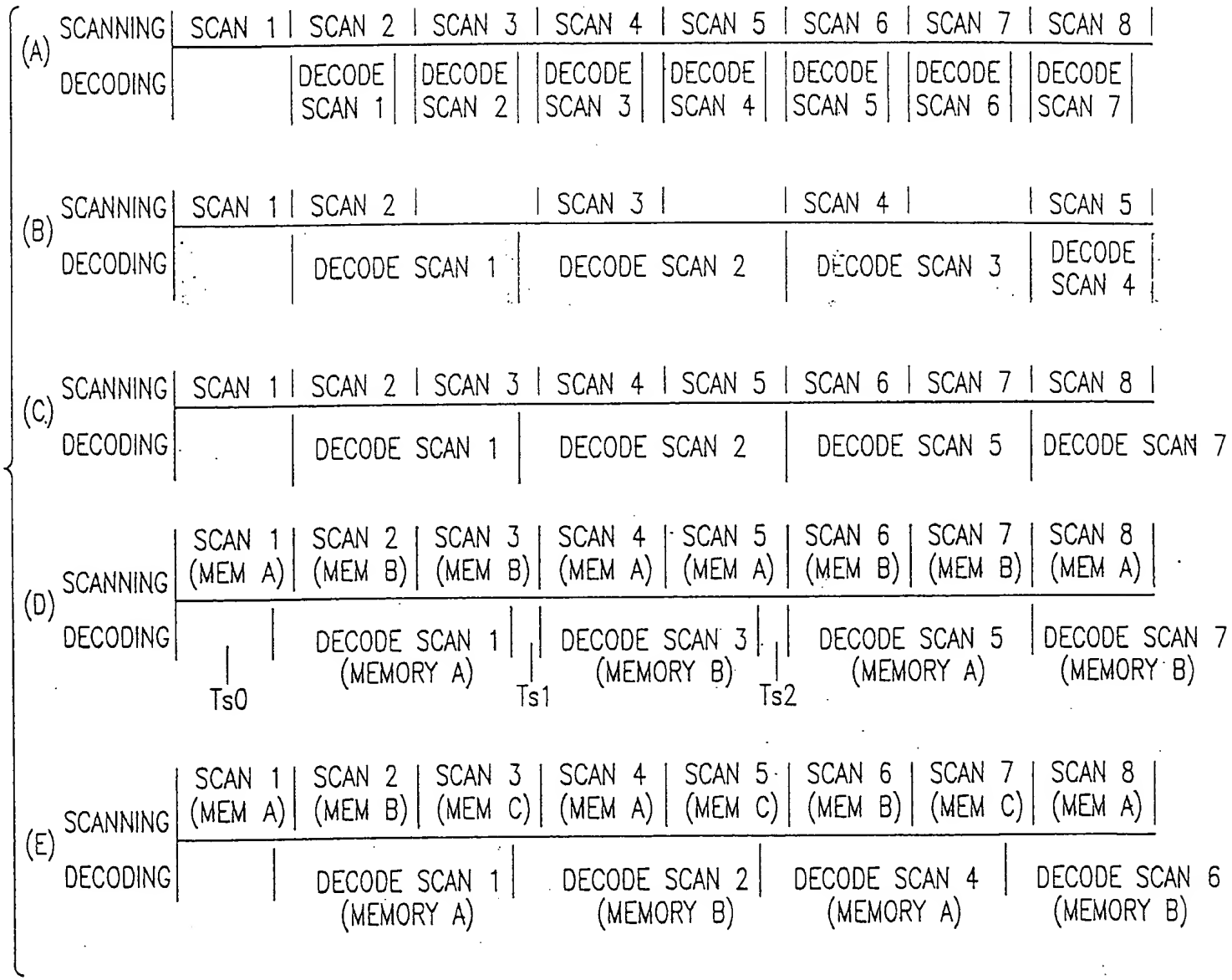
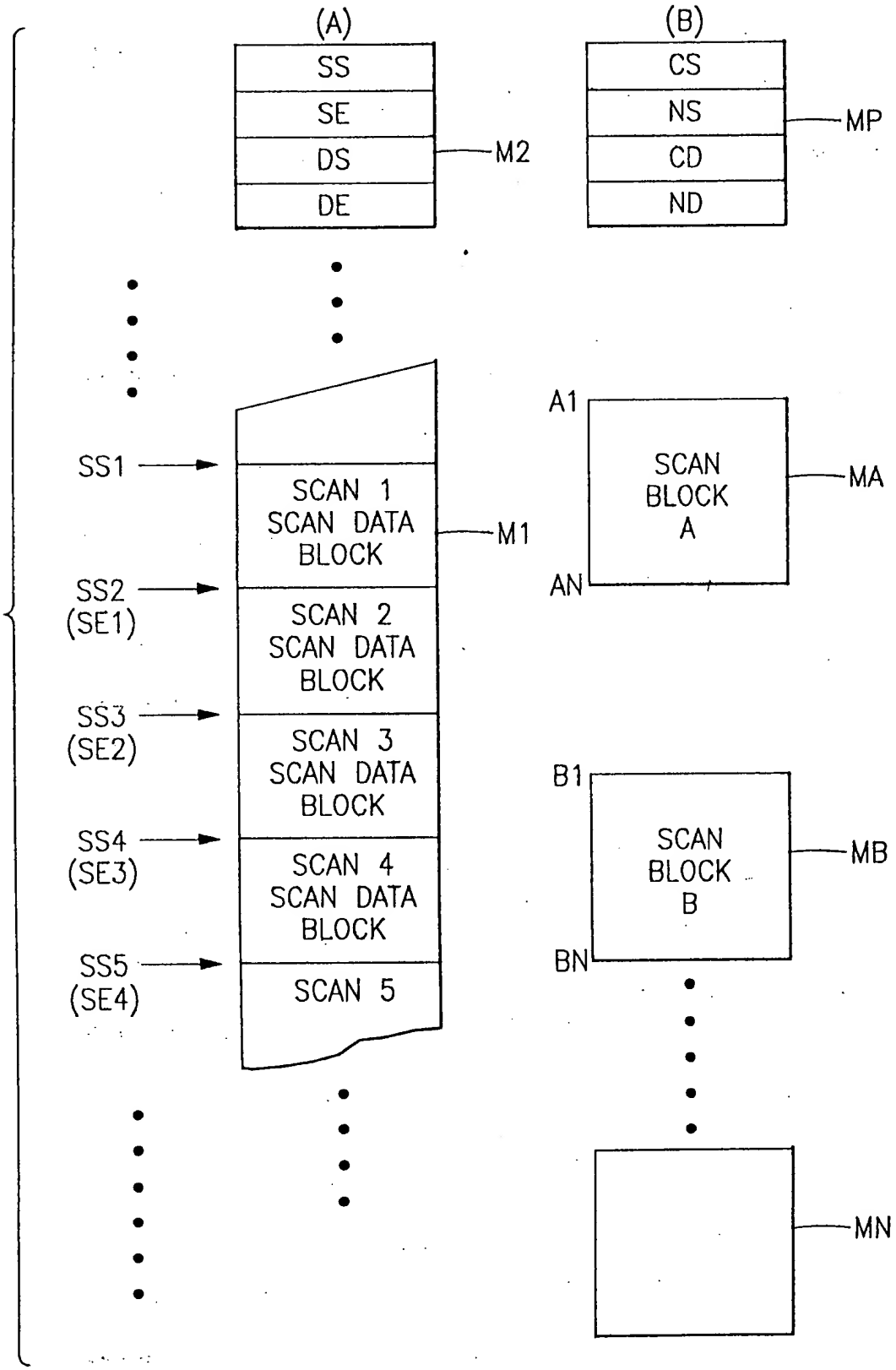

(A)
SCANNING
SCAN 1
SCAN 2
SCAN 3
SCAN 4
SCAN 5
SCAN 6
SCAN 7
SCAN 8
DECODING
DECODE SCAN 1
DECODE SCAN 2
DECODE SCAN 3
DECODE SCAN 4
DECODE SCAN 5
DECODE SCAN 6
DECODE SCAN 7
(B)
SCANNING
SCAN 1
SCAN 2
SCAN 3
SCAN 4
SCAN 5
DECODING
DECODE SCAN 1
DECODE SCAN 2
DECODE SCAN 3
DECODE SCAN 4
(C)
SCANNING
SCAN 1
SCAN 2
SCAN 3
SCAN 4
SCAN 5
SCAN 6
SCAN 7
SCAN 8
DECODING
DECODE SCAN 1
DECODE SCAN 2
DECODE SCAN 5
DECODE SCAN 7
(D)
SCANNING
SCAN 1 (MEM A)
SCAN 2 (MEM B)
SCAN 3 (MEM B)
SCAN 4 (MEM A)
SCAN 5 (MEM A)
SCAN 6 (MEM B)
SCAN 7 (MEM B)
SCAN 8 (MEM A)
DECODING
DECODE SCAN 1 (MEMORY A)
DECODE SCAN 3 (MEMORY B)
DECODE SCAN 5 (MEMORY A)
DECODE SCAN 7 (MEMORY B)
Ts0
Ts1
Ts2
(E)
SCANNING
SCAN 1 (MEM A)
SCAN 2 (MEM B)
SCAN 3 (MEM C)
SCAN 4 (MEM A)
SCAN 5 (MEM C)
SCAN 6 (MEM B)
SCAN 7 (MEM C)
SCAN 8 (MEM A)
DECODING
DECODE SCAN 1 (MEMORY A)
DECODE SCAN 2 (MEMORY B)
DECODE SCAN 4 (MEMORY A)
DECODE SCAN 6 (MEMORY B)

FIG.14


(A)
SS
SE
DS
DE
M2
(B)
CS
NS
CD
ND
MP
SS1
SCAN 1 SCAN DATA BLOCK
M1
SS2 (SE1)
SCAN 2 SCAN DATA BLOCK
SS3 (SE2)
SCAN 3 SCAN DATA BLOCK
SS4 (SE3)
SCAN 4 SCAN DATA BLOCK
SS5 (SE4)
SCAN 5
A1
SCAN BLOCK A
AN
MA
B1
SCAN BLOCK B
BN
MB
MN

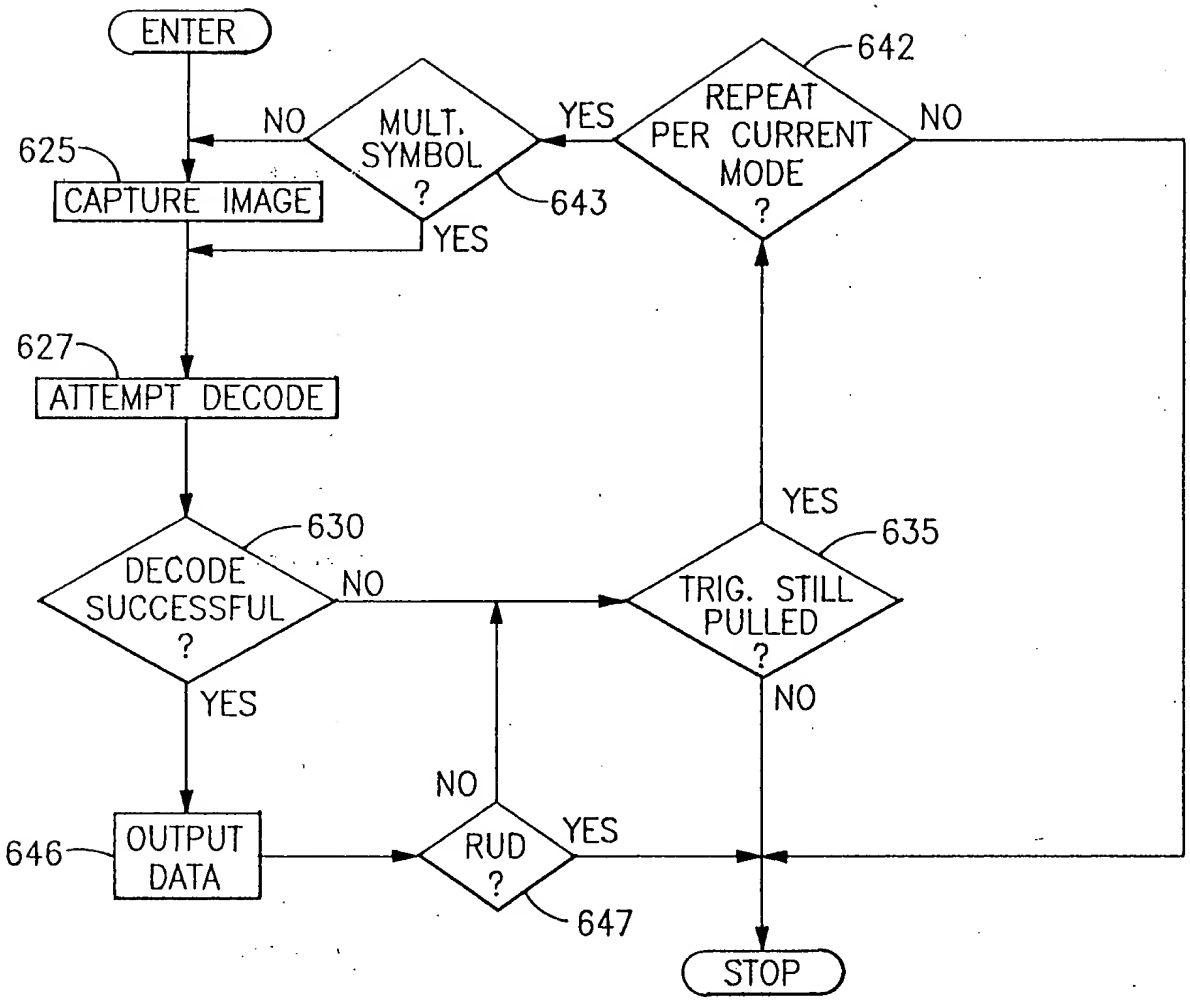

ENTER
625
CAPTURE IMAGE
627
ATTEMPT DECODE
630
DECODE SUCCESSFUL ?
NO
YES
646
OUTPUT DATA
NO
MULT. SYMBOL ?
YES
643
YES
642
REPEAT PER CURRENT MODE ?
NO
YES
635
TRIG. STILL PULLED ?
NO
NO
RUD ?
YES
647
STOP

FIG.15

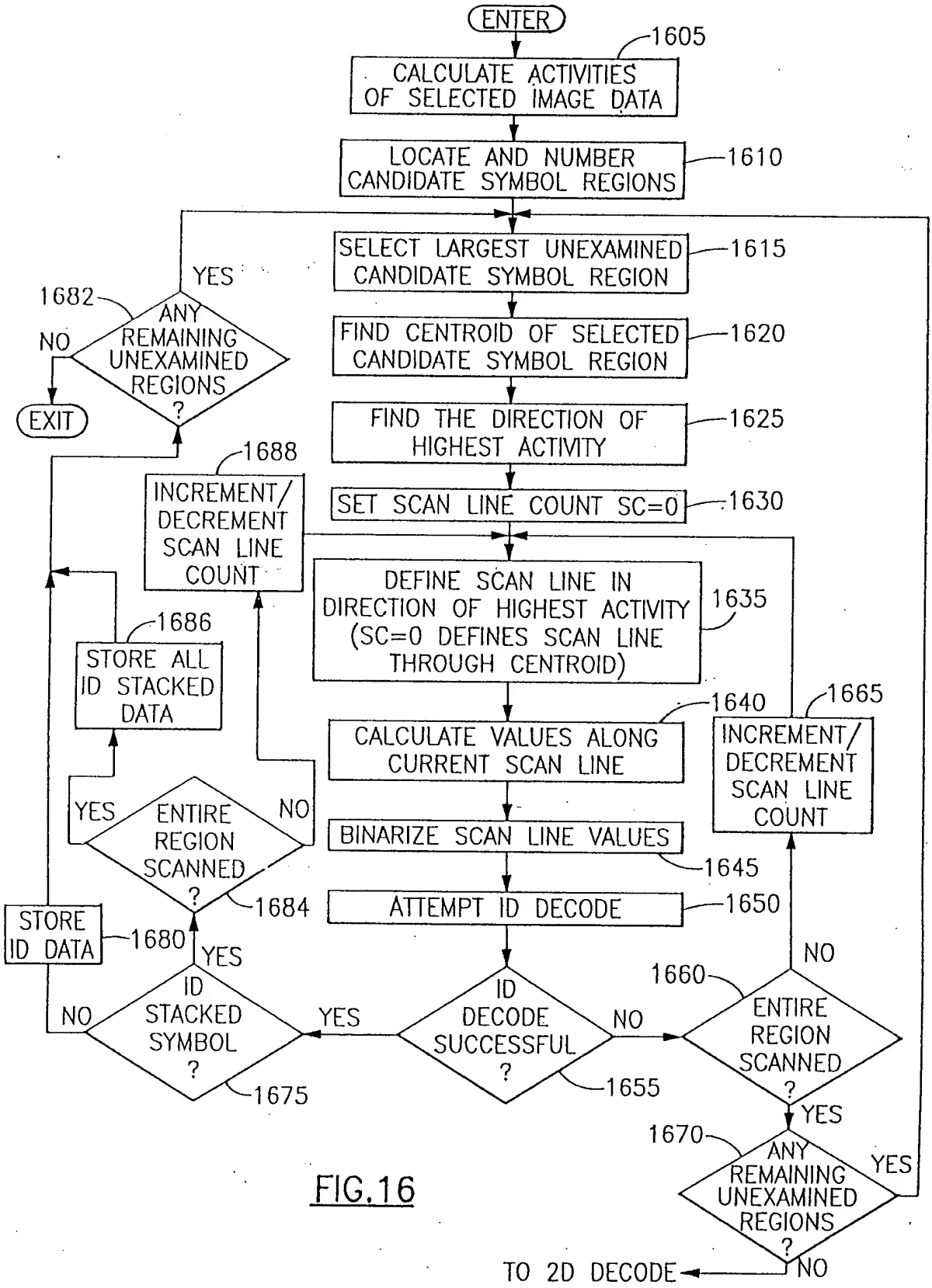

ENTER
1605
CALCULATE ACTIVITIES OF SELECTED IMAGE DATA
LOCATE AND NUMBER CANDIDATE SYMBOL REGIONS
1610
SELECT LARGEST UNEXAMINED CANDIDATE SYMBOL REGION
1615
FIND CENTROID OF SELECTED CANDIDATE SYMBOL REGION
1620
FIND THE DIRECTION OF HIGHEST ACTIVITY
1625
SET SCAN LINE COUNT SC=0
1630
DEFINE SCAN LINE IN DIRECTION OF HIGHEST ACTIVITY (SC=0 DEFINES SCAN LINE THROUGH CENTROID)
1635
CALCULATE VALUES ALONG CURRENT SCAN LINE
1640
BINARIZE SCAN LINE VALUES
1645
ATTEMPT ID DECODE
1650
ID DECODE SUCCESSFUL ?
1655
YES
NO
ENTIRE REGION SCANNED ?
1660
YES
NO
INCREMENT/ DECREMENT SCAN LINE COUNT
1665
ANY REMAINING UNEXAMINED REGIONS ?
1670
YES
NO
TO 2D DECODE
ID STACKED SYMBOL ?
1675
YES
NO
STORE ID DATA
1680
ENTIRE REGION SCANNED ?
1684
YES
NO
STORE ALL ID STACKED DATA
1686
INCREMENT/ DECREMENT SCAN LINE COUNT
1688
ANY REMAINING UNEXAMINED REGIONS ?
1682
YES
NO
EXIT

FIG.16

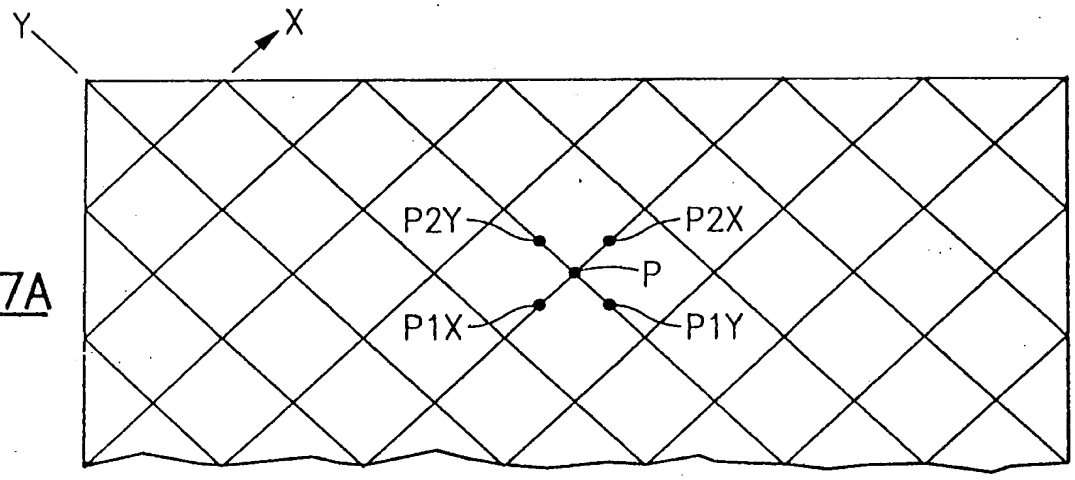


FIG.17A

$$A_P = (P2X-P1X)^2 + (P2Y-P1Y)^2$$

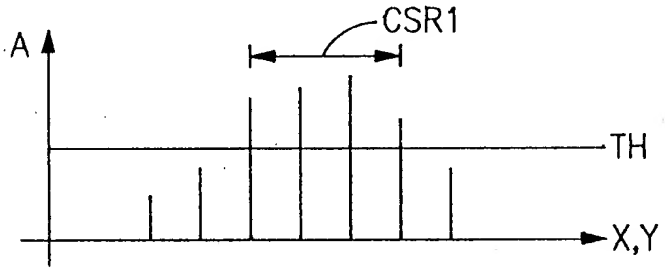


FIG.17B

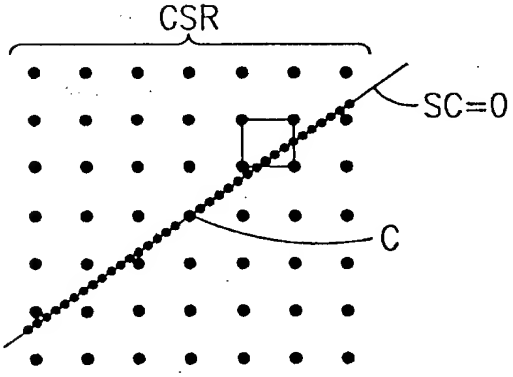


FIG.17C

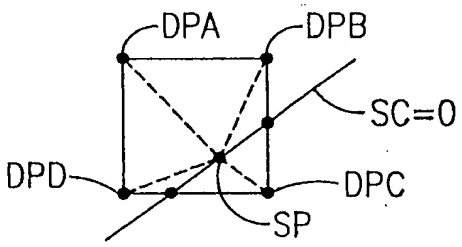


FIG.17D

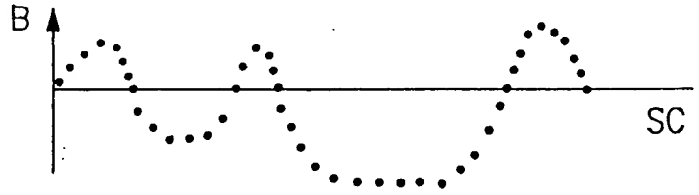


FIG.17E

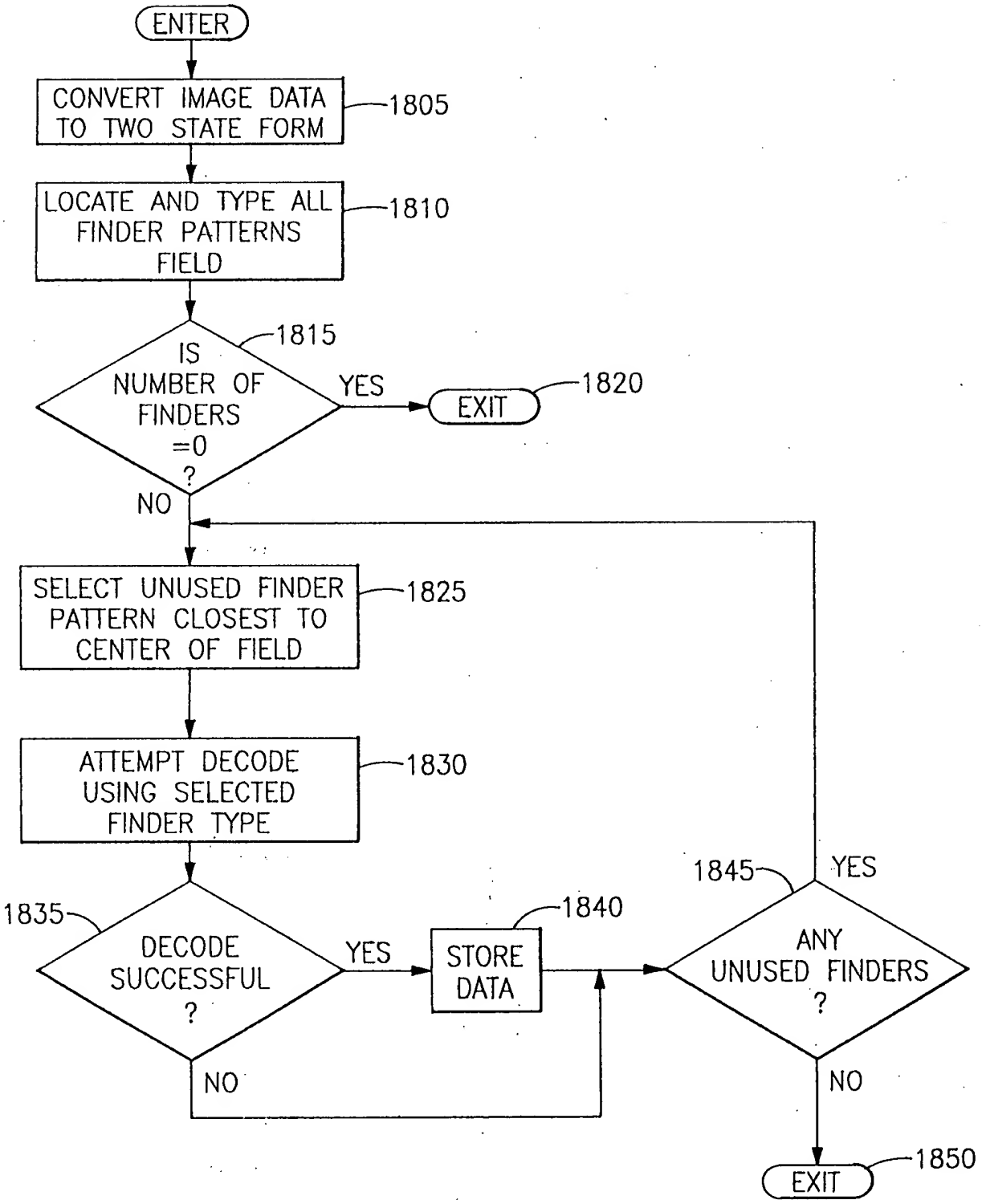

ENTER
CONVERT IMAGE DATA TO TWO STATE FORM
1805
LOCATE AND TYPE ALL FINDER PATTERNS FIELD
1810
IS NUMBER OF FINDERS =0 ?
1815
YES
EXIT
1820
NO
SELECT UNUSED FINDER PATTERN CLOSEST TO CENTER OF FIELD
1825
ATTEMPT DECODE USING SELECTED FINDER TYPE
1830
DECODE SUCCESSFUL ?
1835
YES
STORE DATA
1840
ANY UNUSED FINDERS ?
1845
YES
NO
NO
EXIT
1850

FIG.18

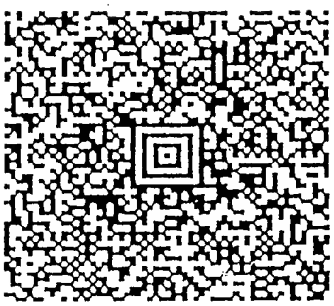


FIG.19A

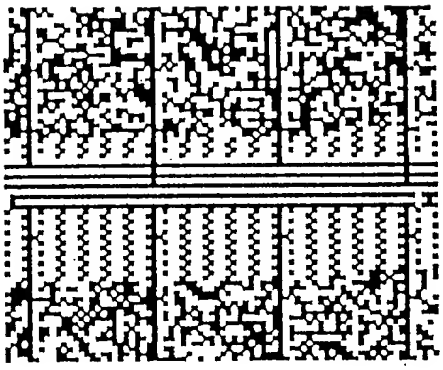


FIG.19B

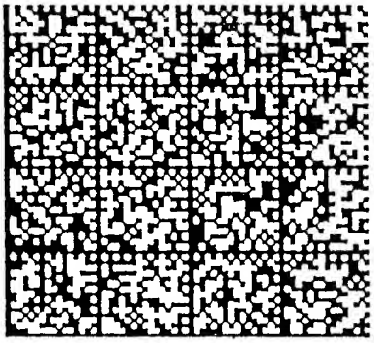


FIG.19C

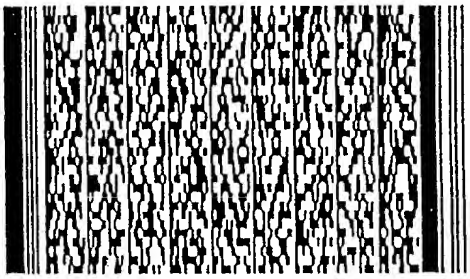


FIG.19D

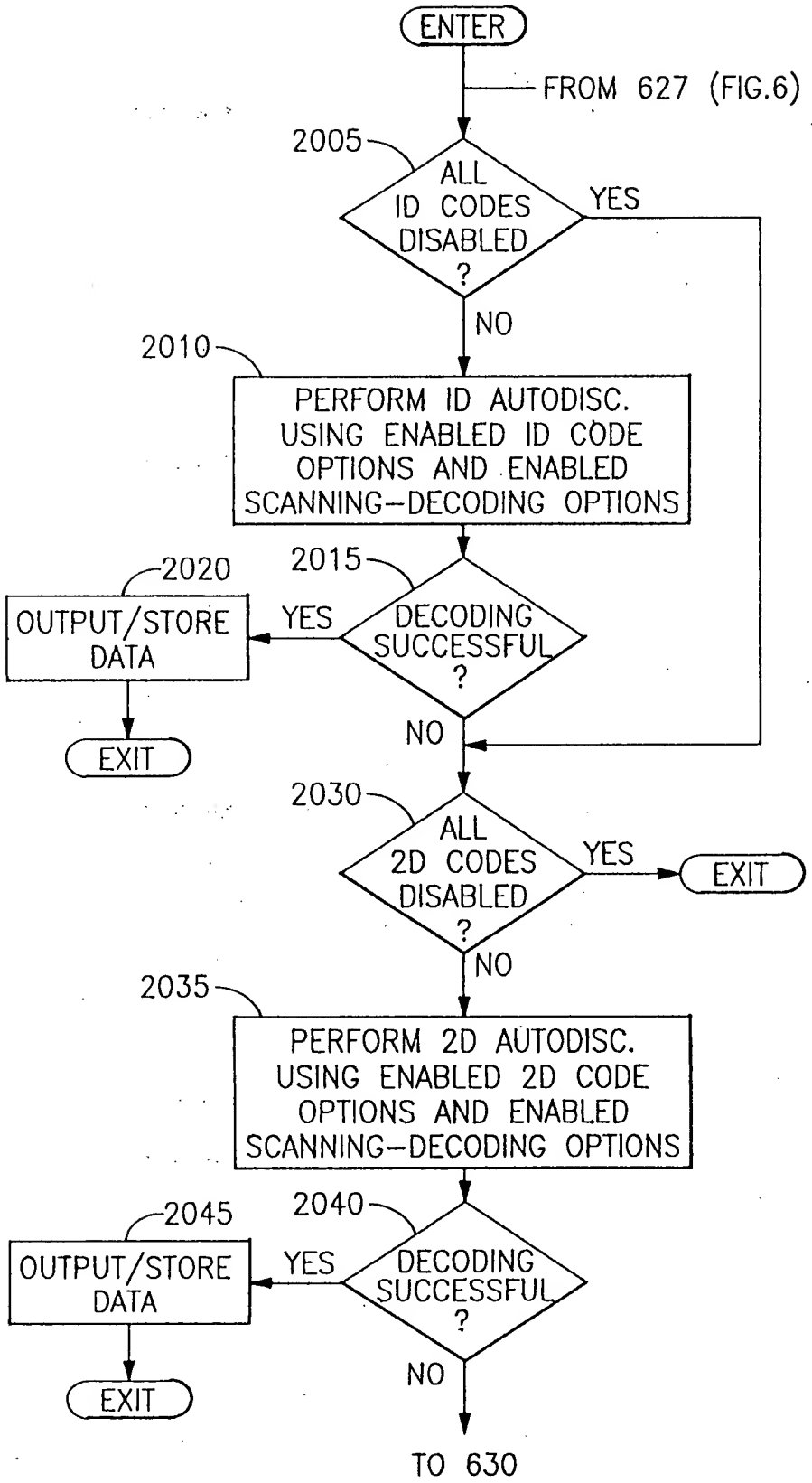

ENTER
FROM 627 (FIG.6)
2005
ALL ID CODES DISABLED ?
YES
NO
2010
PERFORM ID AUTODISC. USING ENABLED ID CODE OPTIONS AND ENABLED SCANNING–DECODING OPTIONS
2015
DECODING SUCCESSFUL ?
YES
2020
OUTPUT/STORE DATA
EXIT
NO
2030
ALL 2D CODES DISABLED ?
YES
EXIT
NO
2035
PERFORM 2D AUTODISC. USING ENABLED 2D CODE OPTIONS AND ENABLED SCANNING–DECODING OPTIONS
2040
DECODING SUCCESSFUL ?
YES
2045
OUTPUT/STORE DATA
EXIT
NO
TO 630

FIG.20